

spots; upper part of head and body with irregular spots; an oblong spot on the lower part of cheek and a triangular spot on the operculum; a series of 3 or 4 linear spots along the middle of the side; a spot at the base of caudal; series of small spots on the dorsal and caudal fins.

Four specimens, 70 mm. in total length, from Trinidad.

I believe this must be the species described by Dr. Gill as *Ctenogobius fasciatus*, although he gives the number of fin-rays as: Dorsal V, 11; Anal 10.

40. *CHONOPHORUS BANANA* C. & V.

Hab. Tropical America.

41. *EVORTHODUS BREVICEPS* Gill.

Hab. Trinidad; Surinam.

EXPLANATION OF THE PLATES.

PLATE XXI.

- Fig. 1. *Tetragonopterus guppyi*, p. 384.
 2. *Haplochilus harti*, p. 389.
 3. *Curimatus argenteus*, p. 385.

PLATE XXII.

- Fig. 1. *Girardinus guppyi*, ♂. 1 a. ♀, p. 390.
 2. *Chirodon pulcher*, p. 385.
 3. *Corynopoma riisii*, ♂. 3 a. ♀, p. 382.
 4. *Tetragonopterus tenuirus*, p. 383.
 5. *Tetragonopterus unilineatus*, p. 384.

PLATE XXIII.

Parauchenipterus pascæ, p. 387.

PLATE XXIV.

Pseudauchenipterus guppyi, p. 387.

PLATE XXV.

- Fig. 1. *Acara pulchra*, p. 392.
 2. *Polycentrus schomburgkii*, p. 391.

2. The Marine Fauna of Zanzibar and British East Africa, from Collections made by Cyril Crossland, M.A., B.Sc., F.Z.S., in the Years 1901 and 1902.—Alcyonaria. By Prof. J. ARTHUR THOMSON, M.A., University of Aberdeen, and W. D. HENDERSON, M.A., B.Sc., Carnegie Fellow, University of Aberdeen.

(Plates XXVI.—XXXI.* and Text-figure 85.)

This report deals with the Alcyonarians in the rich collection of marine animals made by Mr. Cyril Crossland at Zanzibar in 1901-2. The Alcyonarians are mostly littoral forms, *e. g.* species

* For explanation of the Plates, see p. 442.

of *Clavularia*, *Sympodium*, *Xenia*, *Spongodes*, *Lithophytum*, and *Sclerophytum*; but there are also some representatives of the deeper water fauna, e. g., species of *Pteroeides* and *Virgularia*. A few specimens* collected by Mr. Crossland at Cape Verde Islands have been included in the report. We have been indebted to the indefatigable collector for some notes on the colours of the living animals.

LIST OF SPECIES.

Order I. STOLONIFERA Hickson.

Family CORNULARIIDÆ.

- Clavularia garciæ* Hickson.
 " " " var. *inermis*, nov.
 " *flava* May.
 " *gracilis* May.
 " *reptans* Hickson.
 " *strumosa* Ehrenberg.
 " *margaritifera* Thomson & Henderson.
 " *crosslandi*, sp. n.
 " *repens*, sp. n.
 " *pulchra*, sp. n.
 " *zanzibarensis*, sp. n.
 " *mollis*, sp. n.
 " *parvula*, sp. n.
 " *pregnans*, sp. n.
Sympodium punctatum May.
 " *cæruleum* Ehrenberg.
 " *fuscum*, sp. n.
 " *splendens*, sp. n.

Family TUBIPIRIDÆ.

- Tubipora chamissonis* Ehrenberg.

Order II. ALCYONACEA Verrill (*pro parte*).

Family XENIIDÆ.

- Xenia umbellata* Savigny.
 " *quinqueserta* May.
 " *membranacea* Schenk.
 " *cærulea* Ehrenberg.
 " *ternatana* Schenk. var. *elongata*, nov.
 " *rigida*, sp. n.
Heteroxenia elisabethæ Kölliker.
Cespitularia cærulea May.

Family ALCYONIIDÆ.

- Alcyonium pachyelados* Klunzinger.
Sinularia brassica May.
 " *fungoides*, sp. n.
Sclerophytum polydactylum Dana.
 " *querciforme* Pratt.
 " *marenzelleri* Pratt (= *Lobophytum marenzelleri*).
 " *hirtum* Pratt.
 " *viride*, sp. n.
Lobophytum pauciflorum Ehrenberg.

* Viz. *Clavularia parvula*, sp. n., *Lophogorgia crista* Möbius, *Leptogorgia ochracea*, sp. n.

Family NEPHTHYIDÆ.

Subfamily SPONGODINÆ.

- Nephthya zanzibarensis*, sp. n.
 „ „ var. *mollis*, nov.
 „ *armata*, sp. n.
Spongodes hemprichii Klunzinger.
 „ *crosslandi*, sp. n.
 „ *zanzibarensis*, sp. n.
 „ *kükenthalii*, sp. n.

[All these species of *Spongodes* should, according to Kükenthal, be named *Dendronephthya*, but we see no reason to change.]

Stereonephthya zanzibarensis, sp. n.

- Lithophyllum elegans* (Kük.) = *Ammothea elegans* May.
 „ *viride* (Kük.) = *Ammothea viridis* May.
 „ *brassicum* (Kük.) = *Ammothea brassica* May.
 „ *ramosum* (Quoy et Gaimard).
 „ *thyrsoides* (Kük.) = *Ammothea thyrsoides* Ehrenberg.
 „ var. *durum*, nov.
 „ *flavum* May.

Paraspongodes striata Thomson & Henderson.

Subfamily SIPHONOGORGINÆ.

Siphonogorgia intermedia, sp. n.

Order III. PSEUDAXONIA G. von Koch.

Family SCLEROGORGIDÆ.

Suberogorgia köllikeri Wright & Studer, var. *zanzibarensis*, nov.

Family MELITODIDÆ.

Wrightella erythræa Gray = *Mopsa erythræa* Klunzinger.
 „ *variabilis*, sp. n.

Order IV. AXIFERA G. von Koch.

Family GORGONIDÆ.

Leptogorgia ochracea, sp. n.
Lophogorgia crista Möbius.
 „ *lütkeni* Wright & Studer.

Order V. STELECHOTOKEA Bourne.

Section A. ASIPHONACEA.

Family TELESTIDÆ.

Telesto rupicola Hickson & Hiles.
 „ *arborea* Wright & Studer.

Family CÆLOGORGIDÆ.

Cælogorgia palmosa Wright & Studer.
 „ *repens*, sp. n.

Section B. PENNATULACEA.

Family VIRGULARIIDÆ.

Virgularia mirabilis Lamouroux, var. *pedunculata* Kölliker.
 „ *multicalycina*, sp. n.

Family PENNATULIDÆ.

Subfamily PTEROEIDINÆ.

Pteroeides brachycaulon Kölliker.
 „ *rigidum*, sp. n.
 „ *pulchellum*, sp. n.

GENERAL NOTES.

Before proceeding to the systematic description of species we may call attention to some facts of general interest:—

(1) The collection includes specimens of over 60 species, of which 25 are new. But seven of these new forms belong to the prolific genus *Clavularia*.

(2) The most interesting new forms in the collection are the following:—*Clavularia pregnans* (viviparous), *Siphonogorgia intermedia* (which seems an annectent type), *Wrightella variabilis* (a Melitodid with great variability of coloration), *Calogorgia repens* (with encrusting habit), *Virgularia multicalycina*, *Pteroeides rigidum*, and *Pt. pulchellum*.

(3) Mr. Crossland's Zanzibar collection (63 species) and Prof. Herdman's Ceylon collection (42 species) have only 3 species in common, namely:—

Clavularia margaritifera,
Xenia umbellata,
Paraspongodes striata.

Lophogorgia lütkeni, here recorded from the Cape Verde Islands, also occurred in the Ceylon collection.

(4) We have given some illustrations of the great variability of the species of *Clavularia* and *Xenia*, e. g. as to the number of rows of pinnules, the number of pinnules, the bare streak on the tentacles, the spicules, and so on.

(5) VIVIPARITY.—In *Clavularia pregnans*, sp. n., there are large embryos which cause a unilateral protuberance on the polyp-tube a short distance below the mouth. They seem to be liberated by a rupture of the delicate body-wall. Embryos were also found in *Clavularia parvula*, sp. n. Viviparity was recorded by Hickson in *Gorgonia capensis*, and it is probably not infrequent in Alcyonarians, as we have observed it in *Chrysogorgia flexilis* (Th. & H.); *Ceratoisis gracilis* (Th. & H.); *Pennatulula indica* (Th. & H.); *Distichoptilum gracile* (Th. & H.); *Umbellula elongata* (Th. & H.), and *Funiculina gracilis* (Th. & H.), all from deep water in the Indian Ocean. Mr. James J. Simpson has also observed embryos in *Isis hippuris*.

NOTE ON LOCALITIES BY MR. CROSSLAND.

As the Alcyonaria are the most abundant and conspicuous part of the littoral fauna of East Africa, and as certain species and genera are characteristic of different localities, topographical information is of especial importance in connection with their description. As collections from East Africa have been described by some investigators who have contented themselves with giving as locality a small village or islet not to be found on any map, and

only known to those having special acquaintance with these coasts, I give here some notes on the various localities referred to in this report*.

It must be borne in mind that the Island of ZANZIBAR has a length of 60 miles, and is 20 miles wide at the latitude of the town. It is unfortunate that as the same name refers to both island and town, the locality 'Zanzibar' would include every kind of habitat, while 'Beach near Zanzibar Town' refers to only one, or to two, including the special point towards KIUNGANI which is referred to later.

Zanzibar Harbour is really an open roadstead, partially protected by scattered islets to the north and west and by reefs to the south-west. A considerable amount of my collecting was done on Prison Island, which is one of these, while the name of another, Bau (or Bawe), occurs frequently in the reports of Stuhlmann's collections.

At low spring-tide the shores of Prison Island are over large areas literally bright blue with *Xenias* of that colour, and this is the case in very many parts of these coasts. Above the level of low spring-tides very little of anything occurs, the rock-flats being nearly bare. This applies to every part of these coasts, but some specimens, referred to in the report, were collected higher up the shore.

The shore at ZANZIBAR TOWN is, at low-tide level, muddy, and Alcyonaria are nearly absent, except at one point towards KIUNGANI, where a copious salt-spring issues from under the slabs of conglomerate which form the upper part of the shore. Here an oasis of wonderful richness occurs in the desert of mud, and corals and alcyonaria cover the whole shore. Brown *Xeniidae* and several fleshy *Alcyoniidae* are found here in great abundance, some colonies of the latter attaining to the size of a yard across. Dredging just below this level gives good results, but at depths over 3 fathoms or so most of the eastern part of Zanzibar Channel is very barren.

CHUAKA BAY is a large indentation on the East Coast of Zanzibar Island, physically conspicuous, and so coming to be marked on good atlases, but of no commercial utility, producing only a little mangrove timber.

At low spring-tides it presents a great expanse of mud, with channels of water one or two fathoms deep. The lower parts are thickly covered with *Halimeda* sp., and the sides of the channels with grass-like *Zostera*. A large bank in the centre of the bay is covered with large sponges, looking like stones at a little distance. There is no coral anywhere in this area. Alcyonarians, chiefly *Xeniidae*, abound among and upon these weeds, encrusting forms on the bases of the *Zostera*.

* For more detailed information, see Proc. Camb. Phil. Soc. xi. p. 493 & xii. p. 35 (1902).

Towards the mouth of the Bay, on the north side, there are three fathoms of water at low tide, and here another marine *Phanerogam* is abundant, one with a strong hard rhizome and stems, a tuft of opposite leaves arising from the top of each of the latter. On these hard stems great quantities of bright blue encrusting forms were brought up, and among them quantities of brown *Nephthidae*, &c. The quantity and variety of these were most striking, *Aleyonarians* of one kind or another coming up literally by the sackful at many hauls. This spot was almost the richest in *Opisthobranchs* and other interesting forms that I ever dredged in.

Kokotoni Harbour is a broad lake-like enclosure between the Island *TUMBATU* and the north-western shores of Zanzibar. The village, now very insignificant, lies at its south-western corner.

A bank in the narrow southern entrance to the channel upon which corals grow, is a garden of *Aleyonarians* of wonderful variety and beauty, but on the whole the shores are rather barren even of *Xeniidae*. Dredging reveals a current-swept bottom practically barren of all life over the greater part, but in shallower water (5 fath. and under) off the north-west shores an area of great wealth was found, where *Pteroeides* is common.

On the mainland *MOMBASA* harbour and the reefs in its vicinity are very barren, even *Aleyonaria* occurring but sparsely and corals being absent. Sir Charles Eliot had seen a good deal of the coast before I arrived and had selected *WASIN* harbour as the best collecting-ground. This is a canal-like channel separating the island of Wasin from the mainland; the Anglo-German boundary is a few miles south of this. The richness of the shores was found to extend over the whole bottom of the channel. The dredge generally filled with *Aleyonaria* and sponges in a few minutes, a variety of branched and massive forms occurring in the inner or western parts about the Government station of Shimoni, while towards the open sea great quantities of a *Telesto*, generally more or less overgrown with a red sponge, were brought up time after time, while large colonies of *Lophogorgia* with commensal ophiuroids and cirripedes, the latter embedded in the cœnenchyme, are common.

One expects corals, not *Aleyonaria*, to be the most conspicuous and abundant form of animal life in tropical seas, but when it is considered that large strips of the East African shores are bare of coral, whereas *Aleyonaria* occur almost everywhere, and in many places with the profusion one associates with corals, their claim to be of first importance is seen to be well established.

The corals are easily first in the Red Sea, where they abound practically everywhere. *Aleyonaria*, having the same macroscopic characters as those of East Africa, are present in magnificent abundance, but I have not seen numerous *Clavulariidae*, and all the *Xeniidae* seemed to be brown or grey, not green or blue.

DESCRIPTION OF SPECIES.

Order I. STOLONIFERA Hickson.

Family CORNULARIIDE.

- Clavularia garcie* Hickson.
 " *garcie* Hickson, var. *inermis*, nov.
 " *flava* May.
 " *gracilis* May.
 " *reptans* Hickson.
 " *strumosa* Ehrenberg.
 " *margaritifera* Thomson & Henderson.
 " *crosslandi*, sp. n.
 " *repens*, sp. n.
 " *pulchra*, sp. n.
 " *zanzibarensis*, sp. n.
 " *mollis*, sp. n.
 " *parvula*, sp. n.
 " *pregnans*, sp. n.
Symphodium punctatum May.
 " *cæruleum* Ehrenberg.
 " *fuscum*, sp. n.
 " *splendens*, sp. n.

CLAVULARIA.

Note on the Genus.

The problem of species in this genus is very difficult. The differences between species are within a narrow range, and many of the distinctions utilised, *e. g.* number of rows of pinnules, number in each row, seem to be too quantitative in character to be very satisfactory. Moreover, what seem to be well-marked species are connected by intermediate forms, and even in one colony there is sometimes considerable diversity. Let us give some illustrations.

(a) To *Clavularia garcie*, of which Prof. Hickson had one specimen, we are inclined to refer several separate colonies. In some of these the pinnules vary from 13 to 30 on each side, yet the proportions, the general appearance, and the spicules seem identical. Some have one distinct row of pinnules, others have one row with an occasional *simulation* of two rows, others have two or three rows. Other specimens agree absolutely with some of these except that we could find no trace of spicules, though some members of the same colony showed a few scattered rods.

(b) In specimens which agree well with *C. flava* May, we found the pinnules in one row, in three rows, and in four rows; yet these forms were otherwise alike, showing, for instance, very minute ovoid spicules 0.02 in length by 0.015 in breadth. In another quite similar colony the spicules were rod-like—0.02 in length by 0.005 in breadth—and there were also some discs.

(c) To *C. gracilis* May we have referred a colony with pinnules in three rows as May described, and to the same species we have referred another colony with only one row. This seemed at first unjustifiable till we saw that in the colony with three rows in the majority some polyps only showed two rows, while in the colony with one row in the majority some showed two rows.

(d) The total number of pinnules seems to us of more diagnostic importance than the number of rows, but in what we believe to be *C. garciae* we find in one colony a range from 16–30 pairs.

(e) Comparisons of different colonies of the same species show that there is little use attaching much importance to the length and breadth of the bare streak on the tentacles unless one is sure that the forms compared are similarly preserved and in similar states of extension.

(f) Cases like that which we have for purposes of convenience called *C. garciae*, var. *inermis*, lead us to agree with Prof. Hickson that the mere absence of spicules does not make a new species.

Our general conclusion is that further investigation will show that a number of species of *Clavularia* should be merged in one, and that at present attention should be paid to the 'tout ensemble' of characters rather than to any single peculiarity when that is of a quantitative nature.

These remarks may serve to support our impression that some of the species of *Clavularia* are in a state of flux, but they may also suggest an inquiry as to the justifiability of adding seven new species to the already lengthy list. The general answer is supplied by the descriptions given; the characters of the new species seem to exclude the possibility of referring them to any of the species known to us from previous memoirs.

It may be useful, however, to indicate briefly some of their outstanding features:—

C. crosslandi has characteristic exceedingly minute spicules like water-worn sand-grains and they are crowded in eight longitudinal white ridges.

C. repens is like the well-defined *C. margaritifera*, but has very different spicules—minute capstans and some quadrangular forms with an axial cross.

C. pulchra has unusually long polyps, tentacles, and pinnules.

C. sanzibarensis has 6–8 rows of wart-like pinnules practically covering the short blunt tentacles, and the colour is peculiar.

C. mollis has grouped polyps, thread-like pinnules almost covering the tentacles, and an unusual amount of contraction.

C. parvula has very unusual tentacles with only 9 pinnules on each side, though certainly mature, as the eggs and embryos show.

C. pregnantis has short conical pinnules all round the tentacles and a very large genital expansion with embryos.

We may also call special attention to the viviparity readily demonstrable in *C. pregnantis* and also apparent in *C. parvula*.

Very noteworthy in some of the species is the profuse abundance of zoochlorellæ.

The beginning of a differentiation of calyx and anthocodia in *C. margaritifera* may be regarded as a hint of the *Sympodium* type; the slight union of the bases of the polyps in *C. mollis* may perhaps be regarded as pointing towards the *Lenia* type.

CLAVULARIA GARCIE Hickson.

Several specimens appear to be referable to this species, if its diagnosis is made rather more elastic.

The polyps are 10–13 mm. in length, with thin transparent walls, and show no sign of being able to contract. Mr. Crossland states that the living forms had very mobile tentacles opening and closing regularly.

The tentacles are from 6–8 mm. in length and have the pinnules arranged so as to leave a wide bare space on the oral and a narrower bare space on the aboral surface. The long pinnules are in one row and they vary in number from 16 to 30 on each side. There is occasional simulation of two rows.

The fact that the pinnules vary from 16–30 pairs shows that the number of pinnules is not in itself a character of much diagnostic importance.

Minute, slightly roughened, rod-shaped spicules are abundant throughout the colony and give it a peculiar glistening appearance; they are from 0·04–0·05 mm. in length and 0·007 mm. in breadth. Hickson describes the spicules of *C. garcie* as scattered and not crowded; they are here densely crowded.

Locality. Chuaka, E. Zanzibar. Previously from Chagos Archipelago.

In another group of polyps, which we are inclined to refer to the same species, there are some interesting differences. The bodies of the polyps are more substantial, but they are more contracted (5·4 mm. in length). The tentacles are about 4 mm. in length, and while some show two rows of pinnules with perfect clearness, others show three rows equally distinct. The number of pinnules in a row varies from 12–15.

In the body of the polyp and on the tentacles the spicules are closely packed, thus giving a granular glistening appearance to the polyp. The spicules are 0·05 mm. in length, and seem to be *identical* with those above described.

Locality. Wasin, British East Africa.

CLAVULARIA GARCIE Hickson, var. INERMIS, nov.

The polyps, which rise from a membranous stolon to a height of 9 mm., are marked by annulations and also by longitudinal lines. The tentacles are long and pointed, from 3–3·5 mm. in length by 0·8 mm. in breadth at their proximal end. The pinnules are arranged in three rows on each side, in the outer row they may vary from 19–23 in number. They leave a free space on both the oral and the aboral surface. In some polyps we found no trace of spicules; in others we found a few small rods. There are crowded zoochlorellæ.

CLAVULARIA FLAVA May (*non* Hickson). (Plate XXX. fig. 4.)

Four small pieces of a light brown colour appear to be referable to this species. The basal membrane is soft and about 1 mm. in thickness, and bears crowded polyps. The polyps are substantial, marked by annulations and also by longitudinal furrows, 3-4 mm. in length by 0.75-1 mm. in breadth, with *lanceolate* tentacles fully 3 mm. in length, with acute ends.

The pinnules are very short and blunt, arranged in four rows on each side, usually 17 in a row.

The spicules are densely crowded, extremely minute, smooth oval discs, about 0.02 mm. in length and 0.015 mm. in breadth. Prof. Hickson speaks of the spicules of *C. garciae* as the smallest he had seen, but these are much smaller.

Locality. Zanzibar shore, low tide among coral.

Previously recorded from Zanzibar.

In another clump, growing on a monocotyledonous twig, the polyps are usually 9 mm. in length by 1-1.5 mm. in breadth and are longitudinally ridged. The tentacles are 3-3.2 mm. in length by 0.8 mm. in breadth, with the pinnules arranged in three rows on either side of the middle line. The pinnules, many of which are slightly clavate at the tip, leave a long bare space on the aboral surface which extends the whole length of the tentacle and tapers slightly, but on the oral surface the bare space is very wide at the base, narrows quickly, and becomes almost linear for the greater part of the length of the tentacle. The pinnules are from 0.18-0.25 mm. in length by 0.13 mm. in breadth. Abundant ova were present in the lower part of the polyps. The spicules are small rod-like bodies 0.02 mm. in length and 0.005 mm. in breadth, and there were also some discs.

In another colony spreading on *Millepora* some of the polyps showed only one row of pinnules on each side, while contracted forms showed three. The spicules were very minute, smooth, ovoid discs, 0.02 by 0.018 mm.

CLAVULARIA GRACILIS May.

A small colony agrees with this species in having:

- (a) polyps of very diverse lengths, up to 20 mm.;
- (b) short and thick pinnules in three irregular rows (sometimes apparently in two rows);
- (c) no calcareous bodies;
- (d) tentacles about 5 mm. in length.

There is no funnel-like expansion* at the top of the polyp as was frequently observed by May; the bare streak on each side of

* From what we have seen in *C. pregnans*, sp. n., we are inclined to suggest that these expansions, noted by various authors in different species, may be reproductive enlargements.

the tentacles is broad rather than narrow; there are 20-30 pinnules in each row.

Locality. Chuaka, Zanzibar.

Previously recorded from Mozambique, Tumbatu.

To the same species we refer another colony with a thin basal membrane, polyps about 12 mm. in length, tentacles 2-5 mm., and no calcareous corpuscles.

In most of the polyps examined there is most distinctly only one row of pinnules, whereas in *C. gracilis* May there are three irregular rows. We have disregarded this difference because some of the polyps on our specimen showed two rows. As before indicated, this does not seem a specific character of much importance.

Locality. Chuaka.

CLAVULARIA REPTANS Hickson.

A colony spreading over a monocotyledonous leaf seems referable to the *Clavularia reptans* of Hickson. The narrow stolon is from 0.5-1 mm. in breadth and forms a network.

The polyps are distant, separated by an interval of 4 mm. A common length is 3 mm., the breadth is 1-1.5 mm.

As Prof. Hickson points out, this species is noteworthy in having the contracted polyps decidedly broader than the stolon which bears them. This is also true of *C. margaritifera* Thomson & Henderson.

The short tentacles are about 1 mm. in length and bear 12-15 pinnules on each side, each pinnule 0.1-0.15 mm. in length. There are no spicules.

Locality. Zanzibar shore. Previously from Celebes.

CLAVULARIA STRUMOSA Ehrenberg.

The collection included numerous representatives of this species growing on twigs. They appear to be very variable.

The polyps are firm and marked with annulations and longitudinal lines; they are often inflated just below the tentacles or just above the stolon. They vary in length from 4-12 mm. and in breadth from 1-1.2 mm.

The pinnules are short and blunt, arranged in three rows on each side of the middle line, leaving a considerable bare streak on the aboral surface and a fairly wide bare streak on the oral surface of the short but pointed tentacles. The number of pinnules in a row varies from 11-14, but 12 is the usual number.

There are numerous calcareous bodies—oval or roundish discs, length by breadth 0.02 x 0.016-0.018 mm. By transmitted light they appear yellowish to yellowish brown in colour, but by reflected light they appear bluish to bluish green. When the edge is presented to view they appear as oval blunt rods.

The colony comes near *C. strumosa*, but the calcareous bodies are

somewhat different, and no rods are present unless the side view of the discs could be called rods.

In another set of specimens very like those mentioned above the polyps vary from 3·6–5 mm. in length. They are marked by annulations and sometimes by longitudinal lines. The tentacles are short, but the pinnules are arranged in three rows. The spicules are small discs 0·01 mm. in diameter, somewhat pitted in appearance.

Locality. Zanzibar shore. Previously from Zanzibar, Red Sea.

CLAVULARIA MARGARITIFERA Thomson & Henderson.

Numerous stiff white polyps rise at right angles to a height of 6–7 mm. from narrow stolons (0·3–0·4 mm. across) spreading over a flattened twig. The strands of the stolon may form a network, but never coalesce into a membrane. The specimens agree closely with *C. margaritifera*, e. g. in the abundance of interlocked capstan-like spicules (double clubs and double wheels), 0·04–0·07 by 0·02–0·04, with three or four large tubercles at each end, in being broader orally than basally (0·6 at the base, 1·1–1·3 mm. distally), in being often broader than the stolon. A small portion of the upper end of the polyp is capable of invagination along with the tentacles; the expanded tentacles are seen in a few forms as if rising on a narrower neck from within a broader funnel. There is thus the beginning of an interesting distinction between a calycine portion and an anthocodial portion which are separated by a slight constriction. This points on to *Sympodium*. There is a single row of 8 or 9 short pinnules on each side of the tentacles; they are about 0·1 mm. in length.

The specimen differs from that described as *C. margaritifera* in having no spicules on the tentacles. The rest of the surface has a granular appearance due to the spicules.

Locality. Chuaka.

Previously recorded from Gulf of Manaar.

CLAVULARIA CROSSLANDI, sp. n. (Plate XXX. fig. 6.)

The stolon is a membranous plate. The general colour is light brown.

The polyps are long and slender, the walls deeply marked by longitudinal narrow grooves and broad white ridges. The length of the polyps is about 5 mm., the breadth about 0·75. The tentacles are 2·5–3 mm. in length. Many of the polyps have a swelling just below the insertion of the tentacles, 1·2 mm. in width.

The tentacles are flat and lanceolate, with the pinnules arranged in two rows, but this appearance may be due to the crowding of the pinnules of one row. They leave a bare space on the oral as well as on the aboral surface of the tentacles. The pinnules are very short and bluntly conical, thereby differing very markedly from *C. garciae*, which the colour and the longitudinal grooves at first suggested. There are several noteworthy features in regard

to the spicules:—(a) they occur in crowds on the ridges and give these their white colour, and are also continued up the backs of the tentacles; (b) they are irregular ovals like water-worn sand-grains; and (c) they are exceedingly minute, 0·01–0·02 in length by 0·005–0·01 in breadth.

Locality. Zanzibar Channel, low water.

CLAVULARIA REPENS, sp. n.

This colony was found growing along with Hydroids on submerged stems of the marine phanerogram before mentioned. Its colour when living was reddish with brown polyps. The stolon consists of narrow strands.

The polyps are from 4·5–5 mm. in length, with an oral diameter of 0·9–1 mm. They are narrower at the base.

The tentacles are very short, only 0·4 mm. in length, with short pinnules arranged in one row on each side of the middle line. Each row consists of about 8 pinnules, and the two rows leave a very wide bare space on the aboral and a slightly narrower space on the oral surface of the tentacle.

The specimen bears a strong superficial resemblance to *C. margaritifera* Thomson & Henderson, but the spicules are entirely different. Here they consist of a continuous sheet of minute capstans (about 0·03–0·05 mm. in height and about 0·02 in breadth). There are also some quadrangular forms with an axial cross (0·05 × 0·05).

Locality. Common in Chuaka Bay.

CLAVULARIA PULCHRA, sp. n.

A membranous plate gives origin to numerous long polyps (23·5 × 3 mm.) with thin transparent walls. The tentacles, 9 mm. in length, are transparent and feathery, with the pinnules arranged in three rows on each side of the middle line, leaving a bare strip on the oral and also on the aboral surface. The pinnules are long, cylindrical, and incurved, about 1·5 mm. in length, usually 30 in a row. There are a few minute rod-like spicules 0·05 mm. in length and 0·007 mm. in breadth. The colour in spirit is white.

In some respects this species approaches *C. celebensis* Hickson, e. g. in the large number of the pinnules, and in the long polyps and tentacles. It differs in having a membranous stolon (as in May's specimen), crowded polyps, thin polyp-walls (cf. May, p. 44), much more substantial pinnules, and distinct spicules.

In another specimen it is worthy of note that the pinnules are found in all stages of retraction, from 2 mm. in length to small wart-like projections.

Locality. Zanzibar shore.

CLAVULARIA ZANZIBARENSIS, sp. n.

A dense crowd of short polyps arises from an irregular membrane spreading on nullipores. We have been unable to refer it

to any of the known species. The average length of the contracted polyp is 5 mm.

The tentacles are short and blunt, 1·8 mm. in length and 0·7 mm. in breadth. The pinnules practically cover the whole surface; they are very small and wart-like, and are arranged in 6–8 rows. No calcareous bodies are to be seen, but there are abundant zoochlorellæ with a diameter of 0·01 mm. Many of the polyps show abundant ova. The colour in life was described as “pinkish brown with blue tentacles.”

It may be unsatisfactory to establish a new species for specimens which have so few positive characteristics; it seems to us the most workable way of finally arriving at a knowledge of the relationships within this prolific genus. It must be left to some one working on the spot to reduce the number of species by discovering the annectant forms.

Locality. Near Kiungani, Zanzibar.

CLAVULARIA MOLLIS, sp. n.

The polyps of this rather puzzling form arise from a thin semi-transparent membranous plate, 36 mm. long and 21 mm. in maximum width; they seem to be crowded on the surface, but when separated considerable spaces are seen between their bases. They are arranged in small groups of 4–8, which are joined together for a short distance from their base by the fusion of their walls. But each polyp can be traced to its origin, and does not lose itself in a stalk-like portion as in *Xenia*. Scattered between the groups small single polyps may be seen. The polyps are capable of considerable contraction, as some appear like small teat-shaped papillæ on the surface of the basal membrane. The oral opening of the polyps is small and pore-like, situated on the summit of a teat-like papilla. The tentacles are short, with slender pinnules arranged all round. The stomodæum is short, measuring only 0·9 mm. in length by 0·2 mm. in breadth in an adult polyp.

There are numerous ova in most of the polyps.

This species is also represented by a badly-preserved colony 40 mm. in length and 25 mm. in breadth. The stolon is smooth, flat, and membranous. The polyps are 3 mm. in length, nearly 1·5 mm. in diameter, and are much contracted with numerous annulations. The tentacles are nearly as long as the polyps (2·7 mm.). The slender pinnules almost cover the tentacles, but there is a bare aboral streak; a common length is 0·5 mm.; there are 6 rows of about 15 in each row. In the basal portions of the polyps abundant ova are present.

This form approaches in some ways May's *C. flava* (*non* Hickson's *C. flava*), but the pinnules are thread-like instead of being blunt, and there is no trace of spicules.

Locality. Zanzibar shore.

CLAVULARIA PARVULA, sp. n.

A colony spreading upon a stone, the individuals united partly

by narrow stolons but mainly by a coherent membrane. The polyps may attain a length of 5 mm., not including the tentacles, which are usually about 3 mm. long. The breadth of a fully-extended polyp is slightly under a millimetre. Some of the polyps have their tentacles wholly retracted, and are themselves contracted into sugar-loaf-like prominences about 3 mm. in height. There is no evidence of calcareous bodies either in tentacles or polyps, and the colour of the preserved specimen is translucent white.

The most characteristic features are presented by the tentacles. They measure almost half a millimetre at the base, but narrow somewhat quickly and end in a fine point. They appear to be slightly convex aborally and slightly concave orally. When fully expanded they form a circle about 3.25 mm. in diameter. The pinnules are about nine in number on each side, but the four nearest the base of the tentacle are very short, the longest pinnules being usually numbers 4 and 5 from the distal end; they are separated from one another by short intervals; and towards the base, beginning at the sixth, there is a gradual shunting from a lateral position on to the oral surface of the tentacle. In shape the pinnules are cylindrical, and have a somewhat rugose appearance due to contraction.

In another specimen, which had a red colour when living, some of the polyps attain a length of 10 mm., not including the tentacles, and are densely packed with eggs and embryos. In the majority the tentacles and the œsophageal region are completely retracted within the smooth-walled calyx. In some parts of the colony the polyps are connected by narrow stolons about 1 mm. in diameter; in others there is a continuous membrane.

Locality. Cape Verde Islands.

CLAVULARIA PREGNANS, sp. n. (Plate XXX. fig. 3.)

This interesting form is well marked by two peculiarities. In the first place, the pinnules occur all round the tentacles. This unusual arrangement is also seen in *C. inflata* Schenk, but, apart from the generic characters, there is little else in common between the two species. The second peculiarity is that many of the polyps show a large expansion of the body, containing a large embryo or as many as three.

There is a thin basal membrane growing over a polyzoon. The polyps, sometimes marked by contraction-rings, are about 5 mm. in length and 1 mm. in breadth, with slender tentacles of 2.5–3 mm. in length by 0.35–0.4 in breadth. No bare streak is to be seen on the tentacles, which are surrounded by short conical pinnules with a kind of spiral arrangement. Crowded zoochlorellæ produce here and there a glistening appearance, but no trace of spicules could be seen.

Many of the polyps show at a short distance below the tentacles a prominent expansion (2.5 mm. in diameter) of the tube containing up to three embryos. As these grow one side of the

expansion becomes thin-walled and is readily ruptured. The embryos appear as elongated lemon-shaped bodies, 1 mm. in length by 0.75 in maximum diameter. There are numerous ova on the mesenteric bands. It may be suggested that the expansions figured by May in *C. longissima* and *C. strumosa* are also reproductive swellings.

Locality. Wasin Channel, 10 fathoms.

SYMPODIUM PUNCTATUM May. (Plate XXIX. fig. 9.)

A specimen spreading over a monocotyledonous leaf agrees on the whole with the description which May gives of *S. punctatum*. There are two sets of spicules—the upper layer whitish, the lower layer deep red. The spicules are about 0.2–0.3 mm. in length; they are fundamentally of the spindle-type, but bear irregular warty processes, often with sharply truncate ends. The white spicules lie irregularly in an almost continuous superficial covering; the deeper red spicules are partly interlocked by their warty, often branched projections. The colour scheme is slightly different from that of May's specimen, since the red spicules are almost entirely confined to the basal membrane.

Locality. Chuaka shore, low spring-tide. Previously from Tumbatu.

SYMPODIUM CERULEUM Ehrenberg.

To this species we refer several rather poor specimens "of a sea-green colour," with polyps which can be completely retracted. The basal membrane is a broad plate, 33 mm. in maximum length and 16 mm. in maximum width. It is thin at the edges, but 1 mm. in thickness near the middle.

The polyps have short tentacles on which the finger-shaped pinnules are arranged in one row on each side, about 15 in each row.

There is no trace of the calcareous bodies which Klunzinger figures; there are abundant zoochlorellae. The cœnenchyma of the colony is hyaline and non-granular.

Locality. Previously from Tumbatu, Red Sea.

SYMPODIUM FUSCUM, sp. n. (Plate XXX. fig. 5.)

A spreading colony, forming large flexible sheets attached to basal parts of *Zostera*. The living specimens were reddish brown all over, except the tentacles which were drab-brown; the preserved specimens are creamy-white.

The stolon is a membranous plate from 2–3 mm. in thickness, rather thinner at the edges. The polyps are uniformly distributed over the surface, and are capable of complete retraction into the stolon, thus giving it a porous appearance, somewhat honeycomb-like. The pores have a diameter of 1 mm., and are about 0.5 mm. apart. Spicules are numerous in the stolon, and form a superficial network, in the meshes of which the polyps

mm. × 0.04 mm. mm. × 0.05 mm.	minute plates. Oval or bean-shaped clear discs on pinnules.	0.012 mm. × 0.000 mm. 0.024 mm. × 0.006 mm. 0.018 mm. × 0.008 mm. and less.	
mm. × 0.015 mm.	As on polyps, but less abundant.	As on polyps.	Ternate (<i>Schenk</i>).
1 mm. × 0.04-0.05 mm. 0.8 mm. × 0.115-0.13 mm.	In pinnules. Circular discs. Ovals. Also more elongated spicules. In the axis of ten- tacles, long simple spicules and smaller forms as in pinnules.	0.008 mm. in diameter. 0.003 mm. × 0.01 mm. 0.004 mm. × 0.012 mm. 0.075 mm. × 0.01 mm. 0.085 mm. × 0.012 mm. 0.28-0.3 mm. × 0.02- 0.03 mm.	Ternate (<i>Schenk</i>).
2 mm. × 0.057-0.247 mm. 3-0.703 mm. × 0.057-0.075 mm.	.....	.....	Ternate (<i>Schenk</i>).
3-0.156 mm. × 0.044-0.068 mm. 2 mm. × 0.072 mm. 0 mm. × 0.036 mm.	Abundant.	.....	North Atlantic, 80° 3' N., 8° 26' E. (<i>Danielssen</i>).
mm. × 0.08 mm.	As in polyps.	0.36 mm. × 0.06 mm.	Trondhjem (<i>Koren & Danielssen</i>).
.....	.....	.....	Varanger Fiord.
.....	Usually without spicules.	.....	Trondhjem.

stand. Between the larger meshes there are smaller ones on which young polyps are seen.

The polyps are about 5 mm. in length, with tentacles of 1.5 mm., with about 8 short pinnules in a single row on each side. On the lower part of the polyp-body there are no spicules, but just below the base of the tentacles spicules become abundant, at first arranged transversely, then in more or less regular converging double rows running perpendicularly. There are also a few small irregularly-disposed spicules in the tentacles.

This species closely approaches *Sympodium (Acyonium) fulcum* Forsk., but differs in that the upper part of the polyp has no transverse ring of spicules markedly different in size from the longitudinally-disposed spicules, in the presence of spicules on the tentacles, and in other features.

Localities. Wasin, Chuaka, Kiungani. Common.

SYMPEDIUM SPLENDENS, sp. n. (Plate XXIX. fig. 8.)

A beautiful purplish-crimson colony, spreading around a monaxomid sponge. The sponge has a tubular form (probably due to some foreign axis which has been lost). The basal membrane is about 2 mm. in thickness; the polyps occur irregularly, sometimes almost touching, elsewhere separated by intervals of 4 mm. or so. A fully-extended polyp is 3-3.5 mm. in length; the tentacles extend for 2-2.3 mm. further; the average breadth of a polyp is 1.75 mm.

When the polyp is completely retracted we see a blunt conical calyx (often 2.5 mm. in height), with 8 longitudinal ridges not very sharply defined, and ending in 8 triangles. The whole is purplish crimson, except at the summit, where a hint of the yellowish-white polyp is seen. The fully-expanded polyp is almost transparent, for the coloured spicules are not continued beyond the calyx. The flat tentacles have a broad bare streak on each surface; there are two rows of pinnules on each side, 20-24 in each row. There is great variety in the spicules:—(a) Straight and curved spindles with prominent warts, usually few and distant, sometimes fairly numerous (0.4×0.04 , 0.35×0.03). (b) Irregular forms: triradiate (0.175×0.15), quadradiate (0.2×0.125). The great majority are purplish; others are transparent, with a considerable organic residue, a few incline to red.

Locality. Chuaka.

Family TUBIPORIDÆ.

TUBIPORA CHAMISSONIS Ehrenberg. (= *Tubipora musica* Chamisso.)

Locality. Large colonies are abundant wherever coral grows: e. g., Prison Island and the reefs south of Zanzibar Harbour, edge of eastern reef of Pemba. Not found at Chuaka, rare at Wasin.

Order II. ALCYONACEA, Verrill (*pro parte*).

Family XENIIDÆ.

- Xenia umbellata* Savigny.
 „ *quinqueserta* May.
 „ *membranacea* Schenk.
 „ *cœrulea* Ehrenberg.
 „ *ternatana* Schenk, var. *elongata*, nov.
 „ *rigida*, sp. n.
Heteroxenia elisabethæ Kölliker.
Cespitularia cœrulea May.

Note on the Species of Xenia.

In the genus *Xenia*, as in the genus *Clavularia*, the question of species is a difficult one. All the species are within a relatively narrow range, and the differentiating characters are, when taken separately, somewhat trivial. Even in the same colony there are sometimes noteworthy differences in the adjacent polyps—differences which are sometimes as marked as *any one* of the separate items which are used to distinguish species. It seems likely that many of the differences are purely *modificational*, and referable to differences in nutrition and the like.

The number of rows of pinnules is a character which has been much relied upon, but it is apt to lead one astray unless the tentacles observed are equally extended. Moreover, there may be 3 rows at the proximal end and 4 about halfway up, or 2 at the proximal end and 3 about halfway up the tentacle. There can be no confusion between a species with *one* row of pinnules on each side and a species with *four* rows on each side, but to distinguish two species because one has three rows and the other four appears to us quite misleading unless this detail is supplemented by many others. In *X. umbellata* we found from 2–4 rows, in *X. quinqueserta* 3–5 rows.

Some workers have attached importance to the presence of wart-like pinnules along with others of the usual elongated type; but the presence of a few wart-like pinnules at the proximal end appears to us to be very common, and may be naturally expected when a polyp is not fully grown. At the same time, the minute warts of, for instance, *X. rigida* are diagnostic in contrast to the long pinnules of *X. umbellata*.

Another diagnostic feature is the presence or absence of a bare strip on the surface or surfaces of the tentacle, but this is apt to be obscured or exaggerated by the degree of contraction. The bare streak may be present at the proximal end and absent higher up, or quite distinct along the distal half and quite obscured by contraction lower down.

XENIA UMBELLATA Savigny.

The length of the stalk is 24.5 mm., with a maximum basal

diameter of 11 mm.; the polyps are 9–15 mm. in length, 1·2–2 mm. in breadth, with tentacles 6·5–8 mm. in length and 1·5 mm. in breadth. A few young polyps are present among the older polyps, and have an average length of 1·9 mm. and an average width of 0·5 mm. On their small tentacles, however, from 6–7 pairs of pinnules may be seen.

The tentacles in the older polyps are long and slender, with the middle line free throughout its entire length on the aboral surface. The long and slender pinnules are arranged in 2–3 rows on either side of the middle line. Between 30 and 40 were counted on one row. There are abundant calcareous corpuscles of minute size. Numerous zoochlorellæ are also present throughout.

X. umbellata appears to be a very variable species if we extend it to include those forms with not more than 3 rows of very long and numerous pinnules, with tongue-like flattened free axis.

In another specimen the polyps were from 5–11 mm. in length by 1·5 mm. in breadth, with thin transparent walls, with spherical calcareous bodies. The tentacles are long in comparison to the length of the polyp, for they vary from 6·5–7 mm. in a polyp which measures 11 mm., and they may be even longer than the polyps.

The long and slender pinnules (1·4 mm. long by 0·15 mm. wide) are arranged in *two or three* rows on either side of the middle line, leaving on both surfaces a free space which runs the whole length of the tentacle, and giving a fine feather-like appearance to the tentacle.

In the younger polyps, which measure about 3·3 mm. in height, the tentacles reach a length of 2·3 mm., and have the pinnules arranged in 3 rows, in the outermost of which there are from 7–9 pinnules. There are numerous spherical zoochlorellæ.

Another set of specimens (from Chuaka, E. Zanzibar) were characterised by the very long polyps (12–25 mm.), the flatness of the tentacles, and the delicate triangular pinnules in five rows proximally and three rows distally with 24–26 in each row.

Another specimen, which when living was white with yellow-brown tentacles, was found growing over nullipore branches. The stalk is firm and has an average length of 11 mm., and an average breadth at the upper end of 4 mm. The polyps are thin-walled and transparent, thickly placed on the crown, from 5–6 mm. in length, with an average width of 0·8 mm. The tentacles are very feathery in appearance, and vary in length from 2·3–2 mm., and have a maximum diameter of 1 mm.

The pinnules are arranged in *four* rows on each side of the middle line, leaving a free space on both the oral and the aboral surface. In the outer row of pinnules the number varies from 14–18, but 17 is the commonest number.

There are very numerous zoochlorellæ with a diameter of about 0·01 mm., and there are also calcareous corpuscles.

Locality. Wasin Channel, 10 fathoms; previously recorded from New Britain and from the Red Sea.

XENIA QUINQUESERTA May.

To this species, though its validity seems to us doubtful, we refer a colony with a smooth cylindrical stalk 15 mm. long by 4 mm. in diameter. The polyps are crowded in a kind of capitulum, and are, apart from the tentacles, 11 mm. long. The tentacles are 3.5 mm. in length and bear 3-5 rows of short conical pinnules on each side of the well-marked bare streak. There are about 20 pinnules in each row. No calcareous bodies were seen, but there are abundant zoochlorellæ.

It does not seem to us that *X. quinqueserta* May is well defined off from *X. sansibariana* May, and we suspect that both may be varieties of *X. umbellata* Savigny.

Locality. Chuaka. Previously from Tumbatu.

XENIA MEMBRANACEA Schenk.

To this species we refer several small specimens found spreading over the branches of an alga. They agree in having 3-4 rows of pinnules which cover the oral surface of the tentacles except a small triangular space at the base, and leave a bare strip up the aboral surface. There are 15-20 slender conical pinnules in each row. The bodies of the polyps are about 5 mm. in length, with an average width of 0.75; the tentacles are 4-5 mm. in length. There are small polyps at the bases of the full-grown individuals.

Locality. Shore, Zanzibar. Previously recorded from Ternate (*Schenk*) and New Britain (*Ashworth*).

XENIA CÆRULEA Ehrenberg.

To this species we refer a small specimen with two rows of uniform pinnules on each side of the middle line of the tentacle. There is a free streak on both surfaces. The pinnules are slender, cylindrical, and truncate. The body of the polyp was 4 mm. in length, the tentacles were about the same.

Another specimen is distinguished by the thickness of the polyps (2.5 mm. to a length of 9), by the long truncate pinnules, numbering about 24 in each row. In both specimens the colour in spirit was white.

Locality. Shore, Zanzibar. Previously recorded from Red Sea (*Klunzinger*) and Indian Ocean (*Bourne*).

XENIA TERNATANA Schenk, var. ELONGATA, nov.

To this species we refer a specimen with long slender polyps, long flat tentacles, and two rows of pinnules on each side. The pinnules are reduced to warts near the base, but soon become short cones. There are about two dozen in each row.

It differs from Schenk's description, (*a*) in the great length of the polyps (10-19 mm.); and (*b*) in having no supporting trunk, but only a membranous stolon spreading among seaweed. If emphasis is laid on the nature of the pinnules and the number of rows, the specimen may be fairly placed beside *X. ternatana*.

Locality. Chuaka.

XENIA RIGIDA, sp. n.

A small colony 15 mm. in height by 12 in breadth, and 8 in thickness.

The polyps are stiff and substantial, about 3.5 mm. in height, with a basal breadth of 3 mm., tapering to 1.75 at the base of the tentacles.

The tentacles are 2 mm. long and bear three rows of rounded wart-like pinnules, leaving a triangular bare streak on both surfaces. There are about a dozen pinnules in each longitudinal row. The pinnules appear very closely packed in sloping transverse rows of three. The whole surface of polyps and tentacles is thickly covered by minute rod-like spicules (0.06×0.08), which produce a somewhat glistening frosted appearance. Besides these there are numerous zoochlorellæ.

This form resembles *X. plicata* Schenk in having rounded wart-like pinnules in three rows, but differs in the shape of the tentacles, the number of the pinnules, and the nature of the spicules (round or oval discs in *X. plicata*).

Locality. Wasin Channel, 10 fms.

HETEROXENIA ELISABETHLE Kölliker.

A dense cluster of dimorphic polyps borne on a thick stalk about 2.5 centims. in height, and 1 centim. in breadth. The cluster itself has a diameter of 3.5 centims. The living forms were white and grey in colour, and kept the tentacles continually and rapidly opening and closing.

The large polyps are numerous and marked by annulations which are probably due to contraction. They vary from 15–22 mm. in length, and from 2–2.5 mm. in breadth. The tentacles in the fully matured polyps are from 5.5–6.5 mm. in length, and 0.5 mm. in width.

The pinnules are arranged in four rows on each side of the middle line, leaving both on the oral and on the aboral surface a bare strip which stretches the whole length of the tentacle. The pinnules are 0.6–0.9 mm. in length, and from 0.05–0.2 mm. in width. They are all long and slender, with the exception of a few wart-like pinnules at the proximal end.

Besides the relatively distant large polyps, the crown bears numerous small individuals which fill up all the gaps. Those on the margin show tentacles with small wart-like pinnules arranged in two rows. In a polyp 2 mm. long the tentacles are 0.8 mm. in length, and show two rows of pinnules on each side with seven pinnules in each row, leaving a narrow bare space on the oral and a broad bare space on the aboral surface. Towards the centre of the crown the majority of the small polyps show no trace of tentacles or pinnules, but exhibit only a slight tendency to be lobed at the margin. These are usually 4.5 mm. in length and have semitransparent walls.

Locality. Towards Kiungani, just below low tide in a fathom or so of water. Previously recorded from Zanzibar and Port Denison.

As this seems to be a variable species, we add a few notes in regard to other specimens :—

- (a) The colour of some when alive was blue all over; the colour of the preserved specimens may show a tint of green or may be pure white.
- (b) The size of the larger zooids is variable, *e.g.* in length and breadth in millims. 20×2.5 , 15×2 , 7×1.5 .
- (c) No importance need be attached to cases where there seem to be five pinnules abreast on one side of a tentacle, since these trivial deviations occur in colonies where the normal number of four rows is thoroughly dominant.
- (d) Another set of specimens was marked by the following peculiarities :— (1) Somewhat slender stalks, 17–25 mm. in height, rise from a flat spreading membrane. (2) The pinnules, which are mostly absent, seem to have been decidedly shorter than the normal, a deviation which is also noted by May; but it is difficult to say how much of this is purely artificial. (3) The calcareous bodies mentioned by K lliker, but not found by May, are abundant. They are either spherical or roundish oval in shape and highly refractive, with a diameter of about 0.001 mm. Some yellowish spherical zoochlorellae, about 0.36 mm. in diameter, are also present.

Locality. Zanzibar Harbour, lowest tide-level.

CESPITULARIA CERULEA May.

(1) A much-branched colony which was, when alive, of “a brilliant sea-green colour, except the upper faces of the small zooids which were brown.” It seems to be referable to May’s *Cespitularia corulea*, which is described, however, as “flesh-coloured with a tinge of bright blue.”

This specimen agrees with May’s diagnosis in having

- (1) One row of pinnules on each side of the tentacles;
- (2) Polyp-bodies about 4 mm. in length;
- (3) Tentacles about 2.5 mm. in length;
- (4) No calcareous bodies.

The mode of branching, on the whole, corresponds with May’s description; but there is this noteworthy peculiarity, that one division of the colony is sometimes connected with the main mass by a narrow isthmus, *e.g.* 10 mm. in length by 1 mm. in breadth.

(2) Another colony rises from a flattened base which spreads over a part of the surface of a shell, the rest being covered by a sponge. When alive it was described as having “pink stems with slender brown zooids.” The preserved specimen had at first a greenish tinge, which was afterwards replaced by the usual dull creamy white.

The stalk, which soon branches, is fairly firm in texture, but there are no calcareous corpuscles.

Near the base it gives off a small branch which has spread over

a flattened surface, and looks very like a *Clavularia* or a *Sympodium* in the arrangements of the polyps on the upper surface. The principal stalk soon divides into two branches, each of which divides several times and bears the polyps.

The polyps are about 5 mm. in length, and slightly under 1 mm. in breadth, and have bushy heads, caused by the feather-like tentacles. The latter are about 3 mm. in length.

The pinnules are arranged in one row (15-18) on each side, thus leaving on both the oral and the aboral surface a free space which runs the whole length of the tentacle. The pinnules are long and slender, often about 1 mm. in length by 0.1 mm. in diameter at the base and 0.05 mm. in diameter at the tip.

Although this specimen differs from (1) in colour (when living) and in mode of branching, the polyps are closely alike.

Locality. Off the Zanzibar coast, a few miles south of the town; 5 fathoms. Previously recorded from Zanzibar and Kokotoni.

(3) A third specimen was described in the living state as having "a pink body with blue-green zooids"; when preserved it had a clear white colour. The base is formed by the end of the stalk growing round a piece of coral.

The stalk is firm in texture, dividing at a little distance above the base into three main branches, each of which divides and re-divides into the polyp-bearing portions.

The polyps measure 3.5-4.5 mm. in length with an average diameter of nearly 0.1 mm. The tentacles often appear blunt and short, but this is merely the contracted condition, as other parts of the colony show. Sixteen contracted pinnules were counted on each side.

Locality. Kiungani, near Zanzibar town; lowest tide.

It may be of use to emphasize the point that these three specimens presented when living somewhat different coloration:—

- (1) "A brilliant sea-green colour, except the upper faces of the small zooids, which are brown"; (2) "pink stems with slender brown zooids"; (3) "pink body with blue-green zooids." May's specimens were "flesh-coloured with a tinge of bright blue."

This may be enough to show that the natural colours of *Cespitularia* are of little specific moment.

(4) In a fourth specimen the lower end of the stalk spreads over a piece of calcareous conglomerate. The stalk is firm and marked by longitudinal ridges and grooves; it divides into branches, which at some parts bear the polyps themselves, and at others divide into small polyp-bearing branches. The polyps are, on an average, 3.5 mm. in length by 1 mm. in breadth. On the tentacles, which are 1.5 mm. in length, the small pinnules (0.04-0.045 in length) are arranged in one row on either side of the middle line, thus leaving on the aboral surface a broad, and on the oral a narrow free space which stretches the whole length of the tentacle.

Family ALCYONIIDÆ.

Alcyonium pachyclados Klunzinger.*Sinularia brassica* May." *fungoides*, sp. n.*Sclerophyllum polydactylum* (Dana)." *querciforme* Pratt." *marenzelleri* Pratt (= *Lobophyllum marenzelleri*?)." *hirtum* Pratt." *viride*, sp. n.*Lobophyllum pauciflorum* Ehrenberg.

ALCYONIUM PACHYCLADOS Klunzinger.

This species is represented by several typical, much-lobed, almost rigid specimens of a greyish-white colour, with a greenish tint in the surrounding spirit (due to zoochlorella?). The colour was originally like "cocoa-and-milk" and the expanded polyps were dark brown.

A short stalk of about 10 mm. rises from a broad base, and bears several broad lobes, each divided into blunt finger-like lobules covered with polyps. The surface of the cenenchyma exposed when some of the polyps are removed is granular with numerous small elliptical spicules. The tentacles are not dark in colour, as in Klunzinger's specimens; they bear on their oral surface 30-40 short pinnules, usually in four rows, but some more fully expanded showed only two rows, one on each side. The superficial spicules are small ellipses and figure-8 forms; the deeper spicules are for the most part relatively large, spinose, double clubs and double spheres. The following measurements were taken of length and breadth in millims.:— 0.09×0.05 ; 0.075×0.045 ; 0.07×0.04 ; 0.06×0.02 ; 0.05×0.015 . We find more variety in size than Klunzinger indicates, and some of the shapes are exactly like those seen in adjacent species, such as *A. brachyclados*, *A. digitatum*, *A. spherophorum*. It seems to us that there is very little difference between the members of this group of species.

Numerous ova occur in the lower parts of the polyps.

Locality. Covering the shore at one place near Wasin; also at Kiungani, Zanzibar. Previously recorded from the Red Sea, Luzon, Zanzibar.

SINULARIA BRASSICA May.

This species is represented by a complete specimen, which is about 50 mm. in height and 38 mm. in width across the capitulum. The stalk of the colony is firm and erect, the surface granular. The capitulum is divided into three branches or lobes, each of which breaks up into a large number of small knob-like bodies.

The autozooids are abundant, but are either completely withdrawn or just show the tentacles above the general surface. Numerous small spicules are found in the autozooids when they are dissected out.

A young colony, with similar spicules and autozooids, is mushroom-shaped with a small capitulum, on which the autozooids are more numerous at the margin than in the centre. The capitulum is somewhat oval in shape, 9 mm. in length by 7 mm. in breadth. The stalk is long and irregular in shape.

Locality. Wasin Channel, 10 fathoms. Previously from Tumbatu.

SINULARIA FUNGOIDES, sp. n. (Text-fig. 85.)

This species is represented by a large brownish colony, which is tough in texture, rigid, and erect.

Text-fig. 85.



Sinularia fungoides, sp. n.

On the outer surface of the much-wrinkled trunk there is a

thick coating of large spicules, either lying on, or protruding from, the surface, many reaching a length of 6 mm.

On the capitulum, which is thin with incurved edges, the autozooids appear usually in small groups of twos or threes. Each group is generally elevated on a small protuberance, or each autozooid may have a slight elevation of its own. On the edge of the capitulum the autozooids are more numerous, and they do not occur in groups nor are they raised above the general surface.

The spicules are of two distinct types—(1) large spindles, either straight or slightly curved, closely covered with small, rough, wart-like projections; and (2) small spicules which vary from spindles to rods, with rough prominent projections, which often cluster more closely at one end, thus giving a club-shaped appearance. Their measurements are as follows:—

(1) Length varies from 1·4–6 mm. and the breadth from 0·15–0·55 mm.

(2) Length varies from 0·1–0·5 mm. and breadth from 0·03–0·075 mm.

Locality. Wasin, 10 fathoms.

SCLEROPHYTUM POLYDACTYLUM Dana. (Plate XXXI. fig. 2.)

A complete specimen 75·5 mm. in height. The lower part of the stalk is very rigid, with spicules readily visible to the naked eye. The upper part is marked by longitudinal grooves and folds, and is devoid of the larger spicules which are present in the lower part.

The capitulum is divided into a large number of small, blunt, finger-like lobes, on which the autozooids seem to be almost equally distributed.

The numerous small autozooids are almost all completely retracted, a few can be seen with the tentacles appearing above the surface. The tentacles are short (0·6 mm.) and thick, with the pinnules arranged in one row on either side of the middle line of the oral surface. The eleven pairs of pinnules are small, cylindrical, and rather blunt.

The spicules :

I. Of the upper part of stem :—

(a) Large straight or curved spindles covered with many rough tubercles, varying from 0·6–2·7 mm. in length and from 0·15–0·5 mm. in breadth.

(b) Small straight or irregularly-shaped spicules with large rough spines, varying in length from 0·1–0·35 mm. and in width from 0·02–0·09 mm.

(c) Straight spicules with very few smooth spines, varying in length from 0·2–0·7 mm. and in width from 0·075–0·15 mm.

They often show slight traces of four rays, and these show a **X**-marking at the junction of the rays.

II. Of the lower part of the stalk :—

The same types of spicules are present, but there is a marked predominance of (a). They are more varied here and often show

branches or projections. (*b*) and (*c*) are also present, but in both cases there is more variation in the size and shape. The X-shaped marking is more frequent.

III. In the capitulum :—

The second type (*b*) is predominant. They are often branched and the 4-radiate forms are common. In many of them the rough spine-like processes are restricted to one end, and the other end tapers to a point and is free from spines.

Locality. Zanzibar. Previously from Red Sea, China Straits, British New Guinea, Maldives, Gulf of Manaar.

SCLEROPHYTUM QUERCIFORME Pratt.

This species is represented by two fragments.

The stalk is firm and rigid, with the core packed with large spicules. The outer surface of the stalk is granular. From the broken lower end of both fragments large spicules project.

The capitulum is divided into large lobes, which are in their turn divided into very numerous smaller lobes. The polyps are borne principally on the smaller lobes, but many are present on the sides of the larger lobes and on the continuation of the stalk.

The stem-spicules are thick spindles with numerous rough wart-like spines, and slender spindles with numerous rough spines. They vary in length from 0.18–0.23 mm. and in width from 0.03–0.05 mm.

The polyp-spicules are slender spiny spindles, varying in length from 0.12–0.4 mm.

Clubs 0.2–0.25 × 0.1 mm.

Previously from Maldives and Gulf of Manaar.

SCLEROPHYTUM MARENZELLERI Pratt.

A small complete colony, firm and rigid with a much plicated crown. It is 16 mm. in height, and the crown has a breadth of 29 mm. The autozooids appear to be restricted to the top of the folds on the crown and to the margin. The surface has a granular appearance due apparently to the numerous minute siphonozooids. In the crown large white spicules covered with numerous small tubercles are seen projecting often to a distance of 3 mm.

SCLEROPHYTUM HIRTUM Pratt.

A specimen firm and tough in texture, with a total height of 16.5 mm. and a maximum coronal breadth of 20.5 mm. The crown has a large number of small lobes. The autozooids are completely retracted and the lobes have a warty appearance.

From the broken base of the specimen numerous large spicules project. They are spindle-shaped, straight or curved, thickly covered with numerous rough warts, and often show a tendency to divide into several branches. The following measurements were taken of length and breadth in millims.:—3.3 × .5; 2.6 × .35; 3.35 × .55.

A vertical section of the specimen showed numerous yellow ova, with a diameter of 0·7 mm.

SCLEROPHYTUM VIRIDE, sp. n. (Plate XXIX. figs. 2 & 3.)

(1) This species is represented by numerous portions of very large colonies. Some of the colonies were a yard across! In the living forms the general colour was bright green, the polyps were brown, the tentacles green. The stalk in one specimen is 34·5 mm. in height and in the other 30 mm. The portion of the crown is greatly folded and lobed, each of the larger lobes dividing into smaller lobes.

In the majority the autozooids are completely retracted within the general cœnenchyma, but they are very numerous, especially towards the edge of the marginal lobe. The pores left by the retracted autozooids are variable in size, some 0·15 mm. \times 0·1 mm., others 0·075 mm. \times 0·075 mm., and others 0·1 \times 0·075 mm. Their shape also varies from a circular opening to a somewhat oval-shaped pore.

Between the openings of the autozooids lie the numerous very minute openings of the siphonozooids, becoming more numerous in proportion to the autozooids towards the central portion of the crown.

The spicules are of three types:—

- (a) Long slender spindles with few rough wart-like tubercles, in length and breadth in millims. as follows:—0·45 \times 0·06; 0·3 \times 0·03; 0·2 \times 0·025.
- (b) Short, thick, double clubs with a very short median waist and with whorls of rough wart-like tubercles which carry a number of small spines. They vary in length from 0·25–0·3 mm. and in breadth from 0·12–0·2 mm.
- (c) Small oval-shaped spicules with many tubercles as in (b), varying in length from 0·25–0·39 mm. and in breadth from 0·1–0·2 mm.

The last type (c) may be a modification of (b) in which the free central portion has become obliterated. Among the first type (a) several show bifurcations at the ends.

(2) In some other less contracted specimens the autozooids are numerous, up to 7 mm. in length including the tentacles, and are all marked by transverse annulations. On the tentacles the pinnules are arranged in one row on either side of the middle line on the oral surface; the number in a row varies from 10–14. The tentacles are short (about 1 mm.) in comparison to the polyps. The stomodæum, which is greatly wrinkled, is 1·6 mm. in length.

The siphonozooids are very numerous and small, giving the surface a pitted or dotted appearance.

The spicules are of three types:—

- (a) Long slender spindles with very few and wart-like tubercles, from 0·2–0·3 mm. in length and from 0·025–0·03 mm. in width.

- (b) Thicker double clubs with whorls of rough wart-like tubercles, from 0.15–0.3 mm. in length and from 0.035–0.08 mm. in width. In some there is so little waist that the appearance is almost spindle-shaped.
- (c) Thicker and blunter rod-shaped spicules with large and very rough wart-like tubercles, length and breadth in millims.:—
0.22 × 0.1; 0.3 × 0.15; 0.2 × 0.16.

Of the last set (c) some are almost globular in form, owing to the strong development of the wart-like tubercles. Among them there are also a few six-sided flat plate-like scales which have a maximum length of 0.14 mm. and a maximum breadth of 0.11 mm.

Locality. Kiungani, near Zanzibar, and wherever coral abounds.

LOBOPHYTUM PAUCIFLORUM Ehrenberg.

Large brown specimens of this widely distributed species were found at Stations 13 and 16.

Family 3. NEPHTHYIDÆ.

Subfamily SPONGODINÆ.

Nephthya zanzibarensis, sp. n.

” ” var. *mollis*, nov.

” *armata*, sp. n.

Spongodes hemprichii Klunzinger.

” *crosslandi*, sp. n.

” *zanzibarensis*, sp. n.

” *kükenthalii*, sp. n.

Stereonephthya zanzibarensis, sp. n.

Lithophytum elegans (Kük.) = *Ammothea elegans* May.

” *viride* (Kük.) = *Ammothea viridis* May.

” *brassicum* (Kük.) = *Ammothea brassica* May.

” *ramosum* (Quoy et Gaimard).

” *thyrsoides* (Kük.) = *Ammothea thyrsoides*

Ehrenberg.

” *thyrsoides* (Kük.), var. *durum*, nov.

” *flavum* (May).

Paraspongodes striata Thomson & Henderson.

Subfamily SIPHONOGORGINÆ.

Siphonogorgia intermedia, sp. n.

Subfamily SPONGODINÆ.

NEPHTHYA ZANZIBARENSIS, sp. n. (Plate XXVII. fig. 3.)

Two yellowish-white colonies, one attached to a monocotyledonous twig, the other to a leaf. They are respectively in height and breadth, 4 by 3, and 5.5 by 4 centims. The whole colony in its preserved state is flaccid, but is densely covered by a layer of small white spindles with numerous larger ones distributed irregularly over them.

The main stem gives off elongated conical branches, and these bear, especially on their lateral surfaces, numerous finger-shaped lappets covered with polyps.

The Stützbündel consists of 5, 6, or 7 straight warty spindles; the polyp-stalk is covered by regularly arranged closely-fitting small spindles; the anthocodia are at right angles to the Stützbündel and are directed inwards towards the general surface of the colony. On the anthocodia there are eight double rows of ten to twelve spindles in each row; the opposite spindles in the double row converge and the whole double row tends to stand out like a ridge on the surface. There is no sign of spicules on the tentacles.

This species resembles *N. cypressiformis* Kükenthal in general appearance, but the polyp-bearing lobes are more finger-like, and both the general spiculation and the architecture of the anthocodia are quite different.

Locality. Wasin Channel, 10 fathoms.

NEPHTHYA ZANZIBARENSIS, var. MOLLIS, nov. (Plate XXVII. fig. 5.)

A somewhat flattened whitish-grey colony, 7 centims. in height by 3·5 centims. in maximum breadth and about 1 centim. in thickness. At a short distance from the base it gives off a strong side branch, and both it and the main stem bear numerous elongated finger-like lobes or secondary branches bearing these. Almost all the branches and lobes are developed to the sides. The colony is soft and flaccid, but the general cenenchyma is covered with a feltwork of transversely-disposed colourless spiny spindles (0·2 to 0·9 mm. in length) which give it an almost striated appearance. No other type of spicule was to be found in the colony.

The polyps stand almost at right angles to their short stalks; the Stützbündel is composed of about four to six straight spindles (0·75 and 1·25 mm. in length), one of which projects for about 0·25 mm. The anthocodia is supported by eight double rows of about ten spicules in each row.

This form is characterised by the absence of the irregular superficial layer of spicules and by its darker colour, so that we feel justified in making it a new variety.

Locality. Wasin Channel, 10 fathoms.

NEPHTHYA ARMATA, sp. n. (Plate XXVII. fig. 4.)

A stiff colony of a drab-grey colour, 3·5 centims. in height, 3·5 centims. in maximum breadth, and 2 centims. in thickness. A short trunk bears five main branches, from which arise numerous blunt and short finger-like lobes.

The polyps are not densely crowded, but form an irregular spiral on the lobes. In every case the mouth is turned inwards. There is a well-developed Stützbündel, often with four strong spindles and sometimes projecting for about 0·5 mm. The Stützbündel spicules

vary from 0·8 to 1 mm. in length and have an average diameter of 0·1 mm. They are straight warty spindles. Covering the anthocodæ there are numerous small spindles arranged in double rows; the average dimensions are 0·5 mm. in length and 0·06 mm. in breadth. There are also minute spicules on the tentacles, horizontally disposed in two rows.

A prominent feature is that the general coenenchyma bears very large transversely-disposed spindles, which give it a wrinkled appearance. The following measurements in millims. were taken:— $2·6 \times 0·2$, $2·4 \times 0·19$, $1·6 \times 0·16$, and $1·4 \times 0·15$. No other forms of spicules were to be found in the colony.

This species should be referred to a position near *N. digitata* Kükenthal.

Locality. Wasin Channel, 10 fathoms.

SPONGODES HEMPRICHI Klunzinger.

A form closely resembling this species, but the spicules are not red. The trunk has a leathery and rigid character and is rough in appearance, the larger spicules being easily seen. At its lower end it gives off a number of rhizoid-like offshoots, by means of which it is anchored in the sand. The colour in spirits is yellowish white, but in the living colony was a weak chocolate. One colony is 7 centims. in height, 6 in breadth, and 2·5 in thickness, while the corresponding measurements for another are 5, 7, and 3·5 centims. The stem divides almost immediately into three chief divisions, which bear numerous conical lobes densely covered with polyps.

In architecture the polyps agree closely with the description given by Kükenthal of *S. (Dendronephthya) hemprichii*. Each double row of spicules on the anthocodia consists of four to six pairs, but five seems to be the commonest number. We cannot attach much importance to the fact that the spicules are not red as they are in the type, for the colour of the spicules in *Spongodes* is often variable. In *S. kükenthali*, sp. n., we found red, yellow, orange, and colourless spicules. The spicules are long spindles, either straight or curved, and covered with numerous rough spines which are often branched. Their measurements, length by breadth in millims., are as follows:—

Stützbündel spicules: $2·2 \times 0·14$; $2·4 \times 0·15$.

Other spicules: $2·6 \times 0·18$; $2·2 \times 0·14$; $2·3 \times 0·15$; $0·3 \times 0·03$.

Locality. Wasin Channel, 10 fathoms; very common at lowest tides and below. Previously recorded from the Red Sea.

SPONGODES CROSSLANDI, sp. n. (Plate XXVIII. fig. 2.)

A complete small colony of apparently divaricate type, 13 mm. in height by 12 mm. in breadth and 7 mm. in thickness. A short trunk gives off three main branches, which redivide and finally bear the polyps in bundles of 6–10, though a few also occur singly. The general colour of the surface is warm orange, but the anthocodæ and tentacles are covered with chalky-white spicules.

Almost all the polyps are directed towards one of the two flattened surfaces.

The polyp-stalk is about 1·5 mm. in length, and is loosely covered with longitudinally disposed spicules. On the anthocodiæ there are eight double rows of spicules with about eight in each row. Two or three pairs at the top of each row are longer than the others and converge into a triangular projecting point. The orange-coloured Stützbündel spicule projects slightly beyond the anthocodia for about 0·5 mm. The anthocodia has a rounded cauliflower-like form, and the tentacles are neatly incurved on the oral surface, exposing aboral rows of white spicules transversely arranged. The armature of the polyp is the distinctive feature of this species.

Locality. Mouth of Wasin Harbour, 10 fathoms.

SPONGODES ZANZIBARENSIS, sp. n. (Plate XXVIII. fig. 1.)

An incomplete specimen of a beautiful colony, predominantly of a canary-yellow with pink polyps. It belongs to the divaricate section of the genus, and as the contour is irregular and the polyparium flattened it should be referred to Kükenthal's *cervicornis* group. The dimensions are 2·5 centims. in height, 2·5 centims. in maximum breadth, 0·8 centim. in thickness.

The polyps are by no means crowded, and occur singly or in bundles up to seven in number. Their stalks are short, about 1 millim. in length; their mouths are directed inwards and downwards: the Stützbündel has a pair of projecting pink or yellow spicules extending for about 0·5 mm. beyond the anthocodia. On the wall of the anthocodia there are eight double rows of about ten pink spicules in each row; those on opposite sides converge, and each row ends in a triangular point. The tentacles bear a transverse series of yellowish spicules. Over the general surface there is a loose network of large, curved, yellow spindles, below which there is a crowded stratum of small semitransparent forms.

All the spicules are spindles with numerous small spines. The following measurements of spicules were taken:—(a) Stützbündel $3 \times 0\cdot15$; (b) superficial spindles $2\cdot5 \times 0\cdot12$; (c) pink spindles of anthocodiæ $0\cdot9 \times 0\cdot08$; (d) subjacent cœnenchyma-spicules $0\cdot2 \times 0\cdot03$.

This form does not agree with any of the short-stalked species in the *cervicornis* group.

Locality. Wasin Channel, 10 fathoms.

SPONGODES KÜKENTHALI, sp. n. (Plate XXXI. fig. 5.)

A very beautiful species which seems to be referable to a position near *S. (Dendronephthya) coronata*. It belongs to the umbellate type, is slightly flattened, and has an approximately regular outline. Its dimensions are 6 centims. in height, 6·5 in breadth, and 3·75 in thickness. The stem and branches are very rigid; five of the lower branches are foliate and nearly encircle

the stem; the stem gives off a large number of primary branches which break up into secondaries and these bear the twigs with umbels of polyps. The trunk and base are wanting. The spicules on the surface of the general cœnenchyma are transparent near the base and pale yellow higher up. Just below the polyp-bearing twigs some of the yellow spicules show a red core, and there is thus a gradual transition to the crimson-red spicules of the polyp-stalk, anthocodia, and tentacles.

The polyps are arranged in small clusters of 7-10; and these are again grouped into larger umbels. Though there is no crowding, the polyps form a fairly continuous covering. A polyp is usually about 1.5 mm. in length and is covered by longitudinally disposed spindles. Three large ones form a strong Stützbündel which projects beyond the anthocodia for about 1 mm. The anthocodia stands almost at right angles to the polyp-stalk, and is supported by red spindles in 8 double rows, about 7 pairs in each row. A distinctive feature is that the topmost spicules of each double row project in triangular points beyond the bases of the tentacles. The tentacles are white, but bear numerous small red spicules arranged transversely, so that a fine tentacular operculum is formed over the contracted polyp.

The spicules are spindles with fine warts or short blunt spines, and show a great range of colour. Some are red, some are yellow, some are combinations of these colours, and others are transparent.

The largest are those of the Stützbündel, about 4 mm. in length by 0.2 in breadth, and some of those on the polyp-stalk are about 3.5 mm. in length. Those of the general surface of the cœnenchyma are: 2×0.15 mm.; 1.8×0.15 ; 1.5×0.1 ; 1.35×0.1 ; 0.8×0.1 ; 0.35×0.04 ; 0.3×0.03 .

The red spicules of the anthocodiæ are mostly about 0.6×0.04 ; a projecting one had a length of 1.2×0.06 .

Locality. Wasin.

STEREONEPHTHYA ZANZIBARENSIS, sp. n. (Plate XXXI. figs. 3 & 4.)

A small but complete colony of a yellowish tint, 10 mm. in height and 8.5 in breadth. The trunk of the colony is limp, but the main polyp-bearing part is stiff and brittle. The polyps have short stalks about 1 mm. in length; some arise from the trunk, but most are borne on the branches. They occur close together, but are not united into bundles. The anthocodia stands at right angles to the stalk and has its oral opening directed towards the branch. The Stützbündel has one main projecting spicule (1.2×0.125 mm.) supported by 2 or 3 bent spindles on either side; below these there are a few in the direct line of the projecting spicule, passing continuously into the superficial spicules of the cœnenchyma (0.6, 0.4, and 0.25 mm. in length). On the anthocodiæ there are eight double rows of spindles, each row consisting of 15-20. The opposite members of a double row slope towards one another at an acute angle, which widens towards the

base. On the tentacles there are transverse rows of spicules. All the spicules are warty spindles.

As there is no sign of the union of the polyps into bundles, this form cannot be referred to the genus *Spongodes* (Kükenthal's *Dendronephthya*). It falls rather into the old genus *Spongodia*, one of the features of which was the occurrence of isolated polyps. This is now termed *Stereonephthya* by Kükenthal, and defined as follows:—

Very stiff Nephthyidæ, whose polyps are not disposed in lappets or bundles, but occur singly or in small groups directly on the stem or on the main branches, which have few twigs or none. Polyps with Stützbündel.

The spiculation of the anthocodia (15–20 pairs of spicules in each double row) is one of the well-defined diagnostic features distinguishing this form from the eight species recognised by Kükenthal.

Locality. Zanzibar, Chuaka.

LITHOPHYTUM ELEGANS (Kükenthal) = AMMOTHEA ELEGANS May.

In this specimen the polyps vary from 1·1–1·25 in length and have a diameter of 0·7 mm. The polyp-spicules vary from 0·16–0·17 mm. in length with a diameter of 0·01 mm.; the stem-spicules vary in length from 0·3–0·4 mm., and in breadth from 0·01–0·02 mm. The colour of the specimen when living was pink with brown zooids.

Locality. Zanzibar Channel, 10 fathoms, also Chuaka Bay, East Coast of Zanzibar. Previously recorded from Tumbatu, an islet near Zanzibar.

LITHOPHYTUM VIRIDE (Kükenthal) = AMMOTHEA VIRIDIS May.

This species is represented by several specimens, which agree in every detail with the description given. The polyp-spicules vary in length from 0·1–0·24 mm., and in breadth from 0·015–0·03 mm. The stem-spicules vary from 0·08–0·18 mm. in length and from 0·04–0·06 mm. in breadth. The spicules in the inner canal-walls of the stem are in length and breadth, in millims.:—0·54 × 0·12; 0·3 × 0·067; 0·4 × 0·07.

Locality. Wasin, 10 fathoms. Previously recorded from Baui and Muemba.

LITHOPHYTUM BRASSICUM (Kükenthal) = AMMOTHEA BRASSICA May.

This species is represented by one specimen, which agrees very closely with the type. The polyps vary from 1–1·2 mm. in length and from 0·6–0·7 mm. in breadth. The polyp-spicules vary from 0·12–0·34 mm. in length, and in breadth from 0·016–0·02 mm.; the stem-spicules, which are slender with few wart-like spines, vary in length from 0·14–0·4 mm. and in breadth from 0·02–0·03 mm. Mr. Crossland describes the colour of the living specimens as “weak cocoa.”

Locality. Zanzibar; very common among *Zostera* at low spring-tide. Previously recorded from Bauï, an islet in Zanzibar Harbour.

LITHOPHYTUM RAMOSUM Quoy et Gaimard.

A well-preserved specimen of this species showed no trace of any spicules even in the canal-walls. The colour of the preserved specimen is yellow-grey.

Previously recorded from Zanzibar and New Guinea.

LITHOPHYTUM THYRSOIDES (Kükenthal) = AMMOTHEA THYRSOIDES Ehrenberg.

Several fine specimens of this common species, all belonging to what Kükenthal calls the asparagus-like variety—that is to say, with cylindrical stalks rising parallel to one another and united by a common basis. The colour of the preserved specimens is yellowish white, in life it was brownish. One of the distinctive features of this species is that the polyps arise directly from the ends of the stalks. The polyps are from 2–3.5 mm. in length by 1–1.2 mm. in breadth.

The spicules of the stalks and polyps are very slender spindles with few warts. The following measurements were taken of length and breadth in millims.:—(a) polyp-spicules: 0.09 × 0.01, 0.12 × 0.012, 0.18 × 0.016, 0.2 × 0.017, 0.25 × 0.016, 0.28 × 0.016; (b) stem-spicules: 0.12 × 0.016, 0.16 × 0.016, 0.3 × 0.02, 0.35 × 0.02, 0.4 × 0.02.

Locality. Zanzibar. Previously recorded from Tumbatu Island, on the N.W. coast of Zanzibar, and from the Red Sea.

LITHOPHYTUM THYRSOIDES (Kükenthal), var. DURUM, nov.

From a flat spreading base a large number of almost hemispherical lobes arise. Each lobe is closely covered by the projecting calycine portions of the polyps. The colour of the colony is pale orange. The cœnenchyma has a gritty structure, with fairly abundant spicules. The spicules of the cœnenchyma are long slender spindles, either straight or slightly curved, with small spines arranged irregularly or in whorls. Their length varies from 0.15–0.4 mm., and their width from 0.02–0.03 mm.

Locality. Zanzibar, among coral, low tide.

LITHOPHYTUM FLAVUM (May).

The species *Lithophytum africanum*, *L. flabellum*, and *L. flavum* seem to form a close group connected by intermediate forms. There are several specimens in the collection which closely approach *L. flavum*, but differ from it in being far from rigid and in having few spines on the spicules. We see no reason to emphasise this quantitative distinction, especially as the boundaries of the three species referred to are somewhat elastic. Their common features are that several cylindrical stalks spring from a common base, that the polyps are borne on short twigs springing from the ends

of the stalks, that the stalks are united with one another for a variable distance, and that the polyps are restricted to the upper regions.

In representative specimens there are several upright branches dividing into finger-shaped ends, which bear numerous polyps not densely disposed. One colony is 6·5 centims. in height and 5 centims. in breadth at the top. The whole colony is soft and compressible, with longitudinal grooves corresponding to the canals. The preserved specimens are whitish yellow.

The spicules are long slender spindles with very few small and distant spines. The polyp-spicules vary from 0·12–0·3 mm. in length and from 0·01–0·02 mm. in breadth; those of the stem from 0·16–0·3 mm. in length and 0·016–0·02 mm. in breadth.

Locality. Zanzibar. Previously recorded from Tumbatu Island, off Zanzibar.

PARASPONGODES STRIATA Thomson & Henderson.

A very fine specimen, 15 centims. in height by 12 centims. in maximum breadth. In its preserved state it is quite flaccid and has an umber-brown colour. The polyps are borne in bundles of 9–21; all the polyps in a bundle reach nearly the same level. They are about 1 mm. in length and 0·75–0·9 mm. in breadth.

The polyp-spicules are slender spindles, usually straight and covered with few warts. They are from 0·16–0·4 mm. in length and from 0·015–0·04 mm. in breadth. The stem-spicules may be divided into three groups:—(a) long slender spicules with few spines, from 0·3–0·9 mm. in length and from 0·02–0·035 mm. in width; (b) ball-like spicules with many prominent spines; and (c) small irregular X-shaped spicules, very rough and with prominent spines. The two last types vary in length from 0·06–0·2 mm. and in breadth from 0·04–0·12 mm.

Locality. Wasin, 10 fathoms. Previously recorded from the Gulf of Manaar.

Subfamily SIPHONOGORGINÆ.

SIPHONOGORGIA INTERMEDIA, sp. n. (Plate XXX. figs. 1 & 2.)

The most puzzling specimen in the collection is a small cream-coloured colony, with four finger-shaped lobes on a short trunk. On each lobe there are a few relatively distant polyps occurring all round. Most are well-expanded, but some are all but completely retracted into the cœnenchyma.

At first sight the colony suggested a small *Acyonium*; but the polyps have a well-developed anthocodial armature, and the walls of the stem-canals are supported by numerous spicules, some very large. Moreover, the whole somewhat granular surface is covered with a delicate but coherent layer of small spicules.

The anthocodial part of the polyp is supported by eight triangles of sloping spindles, which diverge into a brush-like apex at the base of each tentacle. In some there were 4–5 distinct pairs of

spicules in the triangular sheaf. The triangles rise from a transverse ring of about three rows of spindles.

The cortical spicules are slender spindles with a few rough warts. A common size was 0·8 mm. in length by 0·06 mm. in breadth. The inner spicules of the stem are strong spindles closely covered with rough warts. They vary greatly in size and in the number of warts; some bear fine spines, and some are bifid or slightly branched at one end. A common size is 2·6 mm. by 0·175 mm.

Probably the specimen is a young form, and we found no trace of ova. It seems to us undoubtedly a Siphonogorgid, perhaps intermediate between *Siphonogorgia* and *Chironophthya*; but it is quite unlike any form known to us. With much hesitation we have, for convenience of reference, named it *Siphonogorgia intermedia*.

Locality. Zanzibar shore.

Order III. PSEUDAXONIA G. von Koch.

Family SCLEROGORGIDÆ.

Suberogorgia köllikeri Wright & Studer, var. *zanzibarensis*, n.

Family MELITODIDÆ

Wrightella erythraea Gray = *Mopsea erythraea* Klunzinger.
 „ *variabilis*, sp. n.

Family SCLEROGORGIDÆ.

SUBEROGORGIA KÖLLIKERI Wright & Studer, var. ZANZIBARENSIS, n.
 (Plate XXIX. fig. 4.)

(A.)—A small fragment consisting of a part of a stem or branch from which two lateral branches are given off on the same side. The stem or branch and the lateral branches are all compressed in the plane of branching. The branches come off at an angle which approaches 90°, and then turn upwards and run roughly parallel to the main stem or branch. On both surfaces of the main and lateral branches there is an irregular groove which in some parts almost disappears, being marked only by a narrow strip of colourless spicules. The verrucae are arranged in a single row on each of the lateral surfaces; they are disposed alternately, though at some places they are almost opposite; they are small, and appear as low rounded swellings on the sides.

The polyps are completely retractile, and are white in colour. In the tentacles, which are short, there are small rod- or spindle-shaped spinose spicules which are from 0·08–0·12 mm. in length and have an average diameter of 0·02 mm.

The spicules of the body of the polyp are flattened sword-shaped bodies with rough warts or teeth on the edges, and may be either straight or slightly curved.

The spicules of the general cœnenchyma are all of one type—spindles covered with rough warts, which are arranged in regular whorls, and often blunt at both ends. Some of the spicules are yellowish-amber colour, often almost colourless at the tips; others are quite colourless. Their measurements, length by breadth in millims., are as follows:—

Coloured: 0.2×0.05 ; 0.12×0.06 ; 0.16×0.05 ; 0.16×0.04 ; 0.14×0.05 .

Colourless: 0.06×0.03 ; 0.08×0.04 ; 0.12×0.05 ; 0.14×0.05 ; 0.1×0.04 .

Locality. Wasin Channel, 10 fathoms.

(B.)—Another colony forms a thin encrustation on a piece of bivalve shell, about 25 mm. by 30 mm., with nine stems rising at various angles. Three of the stems lie on the under concave surface of the shell and keep close to it; the four longest on the other side extend to 65–80 mm. from the shell. Two have a single branch. The greatest breadth is about 2 mm. There is a slight flattening in the plane in which the polyps for the most part arise. The general colour is a quiet orange. The verrucæ are inconspicuous and for the most part lateral; some of them show eight distinct marginal lobes. The polyps are pure white. A longitudinal groove is distinct for a short distance from the base. The spicules are spindles with warts in whorls 0.12×0.04 , 0.14×0.04 mm.; and double spindles 0.13×0.06 , 0.12×0.05 ; and a few small almost orbicular forms.

This form approaches *S. köllikeri* Wright & Studer, but differs from it in the size and prominence of the verrucæ and in the size of the spicules, but it is connected to that species by *Suberogorgia köllikeri*, var. *ceylonensis*. But the Zanzibar form has smaller verrucæ and spicules than the Ceylonese variety, and the series may be regarded as illustrating progressive variation.

Locality. Kokotoni Harbour, Zanzibar West, 5 fathoms.

Family MELITODIDÆ.

WRIGHTELLA ERYTHRÆA Gray = MOPSEA ERYTHRÆA Klunzinger.
(Plate XXVIII. fig. 10.)

Small, irregularly branched, rose-red colonies, fixed to coral. The branches are not always confined to one plane. The following measurements were taken of height and breadth in millims.:— 15×23 ; 23×8 ; 15×8 . The specimens agree well with Klunzinger's description of *Mopsea erythraea*, *e. g.* in the presence of a single red spicule at the base of each tentacle and in the dimensions of the spicules generally.

Localities. Wasin, low tide, growing on coral; Prison Island, Zanzibar Harbour. Previously recorded from the Red Sea.

In the Aberdeen University Museum there is a specimen from Samoa which is superficially identical with these. It is labelled *Mopsea erythraea*.

WRIGHTELLA VARIABILIS, sp. n. (Plate XXVIII. figs. 3-9.)

The collection included a considerable number of small delicate Melitodida, of beautiful and apparently variable coloration. The branches tend to be compressed; they lie for the most part in one plane; the verrucæ are for the most part lateral; the spicules are warty spindles, straight and curved, sometimes kneed, and clubs with warty expanded ends which are not foliate enough to be called "Blattkeulen." At the same time, the specimens seem nearer the genus *Wrightella* than any other, and till a large number of specimens is available it seems convenient to combine the various specimens in this collection under the common title *W. variabilis*. They differ not only in colour, but in respect to the proportions and warts of their spindles and clubs. Some of the colour-schemes of these closely-related forms are shown in Plate XXVIII. We may readily distinguish: (a) a form with a variable combination of red and colourless spicules, with more substantial and shorter branches than the others and a closer approach to *W. erythraea*; (b) a form with yellow internodes and the usual brown nodes appearing as red; (c) a salmon-coloured form; (d) a crimson form with yellow verrucæ; and (e) a reddish-brown form with red verrucæ.

Locality. Wasin, among coral, low tide.

Order IV. AXIFERA G. von Koch.

Family GORGONIDÆ.

Leptogorgia ochracea, sp. n.

Lophogorgia cristata Möbius.

„ *lütkeni* Wright & Studer.

Family GORGONIDÆ.

LEPTOGORGIA OCHRACEA, sp. n. (Plate XXIX. fig. 1.)

This apparently new species of *Leptogorgia* is represented by a beautiful dry specimen, 18.5 centims. in height by 15 in maximum breadth. It has a bright ochreous-yellow colour and expands for the most part in one plane with several anastomoses. The disc of attachment has been separated from the substratum and has been overgrown almost entirely by the cenenchyma and a Polyzoon.

From the basal expansion, about 22 mm. in diameter and 9 mm. in height, there rises a main stem, 4 mm. in basal diameter, which gives off numerous branches. Just at the base a large branch is given off, so nearly equal to the main stem in diameter (3 mm.) that it might be regarded as of equal importance. The main stem is at first circular, but soon becomes flattened in the plane of expansion; the larger branches are also flattened, but the twigs are cylindrical. There is no particular arrangement of branches, but the tendency to arise on one side, *i. e.* towards vacant space, is well-marked. The tips of the

branches end in short sharp-pointed cones, as seen, for instance, in *Leptogorgia australiensis*. On the older branches the cœnenchyma is thin and shows distinct longitudinal grooves, which can be traced up into some of the twigs where the cœnenchyma is much thicker. Under a lens the general texture of the surface is granular. As to the polyps, many show wart-like protruding verrucae, about 0.5 mm. in height, 0.75 in breadth, and 1 mm. in length, the elongation being in the plane of the branch. In many cases, however, the contraction is complete, and only slit-like apertures indicate the position of the polyps. They may occur at any point, but on the main stem and larger branches they tend to be lateral.

The transparent pale yellow spicules of the cœnenchyma are warty spindles, while some approach a club-shaped form. They have the following measurements, length by breadth, in millims. :—

(a) Spindles with warts in whorls: 0.18×0.04 ; 0.16×0.05 ; 0.18×0.05 ; 0.2×0.04 .

(b) Spindles with irregularly-placed warts: 0.16×0.06 ; 0.18×0.05 ; 0.18×0.06 .

(c) Small irregularly-warted spindles: 0.08×0.04 ; 0.1×0.04 ; 0.09×0.045 .

Locality. Cape Verde Islands.

LOPHOGORGIA CRISTA MÖBIUS. (Plate XXIX. figs. 5-7.)

Two plume-like brownish-red colonies resemble *Lophogorgia crista Möbius* in the following features:—(1) the general habit of the colony; (2) the flattening of the larger branches in the plane of ramification; (3) the nature and thickness of the cœnenchyma; (4) the hint of striations; and (5) the spiculation near the base.

The two colonies measure 34 and 35 centims. in length, 6 and 10 centims. in breadth; the basal (broken) ends 7 and 6 mm. in one diameter and 3.25 and 3.4 mm. in the other.

The spicules from the lower end of the colony are warty spindles, with the warts in 2-4 whorls. They are beautifully coloured, with the spindle-core red and the projecting warts of a pale translucent yellow. The following measurements were taken (in millims.):—

(a) Of spindles with two whorls of warts: 0.09×0.05 ; 0.1×0.06 .

(b) Of spindles with three whorls of warts: 0.09×0.05 ; 0.1×0.06 .

(c) Of spindles with four whorls of warts: 0.1×0.04 ; 0.12×0.06 .

Spicules taken from the tips of the branches are slightly different from those at the base. Many of them are longer, more slender spindles with up to 10 whorls of warts. The following measurements were taken of length and breadth in millims. :— 0.18×0.04 ; 0.19×0.04 ; 0.16×0.06 ; 0.13×0.06 . The majority are coloured like those at the base, but there are also some wholly yellow forms with warts either regularly or irregularly disposed.

These specimens differ essentially from *L. lütkeni* Wright & Studer in the following particulars:—

- (1) There is no distinct "irregular wavy line" on the branches.
- (2) The polyps are distributed all over the cœnenchyma.
- (3) The spicules never exceed 0.19 mm. in length (in *L. lütkeni* up to 0.34 mm.).
- (4) The colour of *L. lütkeni* is a dull yellowish red.

From *L. crista* Möbius they also differ in a few details:—

(1) In *L. crista* there are numerous striations on the cœnenchyma especially near the base, but these diminish in number in the younger branches; in our specimen the striations are very faint.

(2) The figures of spicules given by Möbius are not quite like those in our specimen, but the variation in the size and form of the spicules in the different parts of the colony which we have noted in detail has led us to disregard the minor differences. It may be that the spicules described and figured by Möbius were taken from the cœnenchyma near the base.

(3) The colour, both of the specimens themselves and of the spicules, shows a marked difference, but this does not justify their separation from *L. crista*.

Locality. Cape Verde Islands. Previously recorded from Algoa Bay.

LOPHOGORGIA LÜTKENI Wright & Studer.

This species is represented by a piece of a colony 295 mm. in maximum height and 105 mm. in width. It is branched in one plane, with the branches flattened in the plane of branching and marked by a distinct groove along both the flattened faces. The polyps are confined to the lateral surfaces of the branches and twigs; their verrucæ are reduced to slight elevations of the general cœnenchyma. The species is practically identical with the forms which we referred to *L. lütkeni* Wright & Studer (Ceylon Pearl-Oyster Fisheries Reports), and shows the same minor divergences from the type.

Locality. Wasin, British East Africa, 10 fathoms. Previously recorded from Cheval Paar, Gulf of Manaar.

Order V. STELECHOTOKEA.

Section A. Asiphonacea.

Family TELESTIDÆ.

Telesto rupicola Müller.

„ *arborea* Wright & Studer.

Family CÆLOGORGIDÆ.

Cælogorgia palmosa Wright & Studer.

„ *repens*, sp. n.

Family TELESTIDÆ.

TELESTO RUPICOLA Müller.

Under this species we have ranked three somewhat different specimens. The first consists of a single axial polyp 141 mm. in length, the lowest part of which is covered by a monaxonal sponge through which the lateral polyps protrude. The colour of the living specimen was yellowish with white zooids.

The axial polyp is 1·5 mm. in thickness near the point where it emerges from the surrounding sponge, but at the tip it is only 0·75 mm. The lateral polyps stand at regular intervals of about 6·5 mm. on all sides of the axial polyp; their height varies from 4–4·5 mm. and their basal diameter is 1·1 mm. In the lateral polyps the tentacles are 1·2 mm. in length and about 0·5 mm. in breadth, with numerous pinnules, which have an annulated appearance. On both sides of the base of each tentacle there are two bands of spicules which extend down the anthocodial part and join the spicules of the calyx. On the axial polyp and on the lateral polyps there are eight prominent ridges.

This specimen approaches *Telesto rupicola* of Hickson & Hiles, but there are some differences:—

- (1) The tentacles of our specimen are longer.
- (2) The arrangement of the lateral polyps is more regular.
- (3) It does not very closely resemble Hickson's figure (Willey's Results, pl. 1, fig. 1).

We note, however, the variability of *Telesto rupicola* as mentioned in Hickson's 'Aleyonaria of the Maldives,' pt. i. p. 482, and also in the 'Challenger' Reports, vol. xxxi. p. 262.

In the second specimen the axial polyp is 2 mm. in thickness, growing gradually less as it rises higher, and becoming 1·5 mm. near the tip. After treatment with caustic potash the hollow axis is seen to be composed of two types of spicules, some long and slender with few and slight projections, the others short and stout with numerous strong projections. The first type varies from 0·45–0·63 mm. in length and from 0·02 to 0·028 mm. in width; and the second from 0·15–0·2 mm. in length and from 0·02–0·028 mm. in width.

The third specimen differs slightly from both the others, but it also seems referable to *T. rupicola*.

Locality. Mr. Crossland notes: "By the kindness of Captain Agnew, R.N.R., I accompanied the steamer sent to overhaul the buoys and chains and found these specimens on the chains of the buoy nearest Zanzibar to the south."

TELESTO ARBOREA Wright & Studer.

One of the specimens is dark in colour and consists of a few axial polyps. From the axial polyps lateral polyps arise, and among these there are some decidedly larger than the others, which may be the beginnings of axial polyps of the second order.

The tentacles were measured in two specimens and were found to vary from 2.95–3 mm. in length. The surface spicules (0.5×0.05) are longer than the spicules of any of the other specimens. The axial polyps vary from 57–59 mm. in length and from 1.2–1.3 mm. in diameter. The average length of the lateral polyps is 4 mm.

The axial polyp treated with boiling caustic potash showed a firm compact tube marked by longitudinal ridges, and formed of two layers of spicules, an outer layer of stouter spicules, an inner of more slender forms.

Locality. Wasin, 10 fathoms.

In another specimen there is a rhizoid-like attachment. The primary axial polyp has been broken, but it is still 67 mm. in length. The complete secondary axial polyps are 95 mm. and 72 mm. in length. The lateral polyps are arranged irregularly on the axial polyps. On the lower part of the secondary axials they are 3 mm. by 3 mm., while on the upper part they are 2.6–3 mm. by 1.6 mm.

The axial polyp treated with boiling caustic potash shows a coherent tubular axis formed of two layers of spicules, an outer layer of stouter spicules with more prominent spines and an inner of longer, more slender spicules with few spines.

Locality. Wasin, 10 fathoms.

In another specimen the colour was light brown, the lateral polyps were about 3 mm. in length, and the longitudinal grooves were much less marked than in those above described. The spicules are transparent spindles with long, irregular, sometimes branching spines. The following measurements were taken of length and breadth in millims. :— 0.12×0.04 ; 0.14×0.05 ; 0.18×0.05 ; 0.2×0.06 .

Locality. Kokotoni Harbour, Zanzibar West, 5 fathoms ; Wasin Channel, 10 fathoms. Previously recorded from Arafura Sea, 49 fathoms.

Family CÆLOGORGIDÆ.

CÆLOGORGIA PALMOSA Wright & Studer.

A number of fragments which are evidently the portions of a large colony. In some of the larger fragments the axial polyp of the first (?) order attains a diameter of 5 mm.

The specimen agrees closely with the description given by Wright & Studer, except that in the tentacles, which are short and stumpy, there are four rows of pinnules on the oral surface, and in the outer row there are usually *ten* pinnules, not *eight* as stated in the 'Challenger' Report. The colour of the colony when preserved in spirit is a very pale green, but when dried it is almost white. The green colouring-matter is very soluble in spirit.

The present specimen also shows a greater degree of elasticity than that ascribed to the 'Challenger' specimen ; when dried, however, it is very brittle and hard.

Locality. Station 12.

Previously recorded from Zanzibar (*Rousseau*); Nossi Bé in the Mozambique Channel, 10-12 fathoms (*Keller*).

CÆLOGORGIA REPENS, sp. n. (Plate XXXI. fig. 1.)

Several spreading colonies hardly exceeding 6 mm. in height. There are numerous polyps, in some groups of which it is impossible to distinguish the primary axial polyp from the others. The smallest polyps are mere papillæ 1.5 mm. in height, rising from a basal membrane; the longest project freely for 6-8 mm. An average breadth is about 1 mm. The surface is glistening white, and even to the naked eye appears rough and spicular. It is continuously covered with longitudinally disposed spindles.

On the upper part of the polyps there are eight longitudinal ridges ending in triangular points, which bend inwards to form a kind of operculum over the inturned tentacles. Each ridge is composed of a double row of spicules, and the components of each row overlap so that there may be three abreast at any one place. In the lower part of the polyp the grooves between the ridges are sometimes prominent and bordered by pairs of spicules from the two adjacent ridges meeting like the letter V with the point downwards. In other cases the lower part of the polyp seems to be uniformly covered.

The short and broad tentacles are completely inturned; they bear about 6-8 rows of short conical pinnules (13-16 in a row) covering the whole of the oral surface. On the aboral surface there are numerous minute spicules arranged in chevron. The spicules of the general surface are spindles with irregular spines and warts. The following measurements were taken of length and breadth in millims.:- 0.75×0.08 ; 0.7×0.05 ; 0.4×0.04 .

There can be but little doubt that these specimens represent young stages of colonies which have assumed an encrusting habit. They differ conspicuously from *C. palmosa* not only in the habit of growth, but in being rough and in having much larger spicules.

Locality. Wasin.

Section B. Pennatulacea.

Family VIRGULARIIDÆ.

- Virgularia mirabilis* Lamouroux, var. *pedunculata* Kölliker.
 „ *multicalycina*, sp. n.

Family PENNATULIDÆ.

Subfamily PTEROEIDINÆ.

- Pteroeides brachycaulon* Kölliker.
 „ *rigidum*, sp. n.
 „ *pulchellum*, sp. n.

Family VIRGULARIIDÆ.

VIRGULARIA MIRABILIS Lamouroux, var. PEDUNCULATA Kölliker.

The rachis is 172 mm. in length, but the upper part (for 51 mm.) consists of nothing but the axis, which tapers to a fine thread. The axis is 0.42 mm. in diameter, brownish in colour, and marked by a large number of parallel transverse striæ. Towards the upper end of the unweathered part of the rachis the transparent pinnules are very closely packed together and smaller than those on the lower part of the rachis. They are separated from one another by intervals of 0.8 mm., and vary in breadth from 0.9–1.05 mm. and in height from 0.6–0.7 mm.

On each pinnule there are six or seven polyps in a single row. There is a clear streak on both rachidial surfaces of the rachis, but that on the prorachidial surface is slightly wider and has a groove running up the middle. The cœnenchyma is thin and transparent, allowing the axis to shine through on both surfaces.

Locality. Kokotoni, Zanzibar Island. In the mud at ordinary low-tide level. Previously recorded from Scandinavia, Denmark, Iceland, and Gulf of St. Lawrence.

VIRGULARIA MULTICALYCINA, sp. n. (Plate XXVI. figs. 4 & 5.)

A well-preserved portion of a colony, probably near the tip. It has a light brown colour, and was described when living as "black and light drab." In a length of 22 millims. there are on each side 11 pinnules, each about 2.25 mm. in height, and bearing about 66 polyps in 2–4 rows. The breadth of the vane is 8 mm., that of the axis 1.35. On the prorachidial surface there is a bare streak 2.5 mm. in breadth, with a median longitudinal groove. At the insertion of each pinnule there is a superficial ramification of the nutritive canal, forming a characteristic pattern. The metarachidial surface has also a bare streak, but this is entirely hidden by the interlocking of the pinnules, which form a quite continuous covering over the whole of that surface.

Very characteristic is the undulatory curvature of the margin of the pinnule; the ends of the insertion are on about the same level on the prorachidial and metarachidial surfaces. The calices are very distinct, barrel-shaped with narrowed mouths and longitudinal ridges. A polyp with expanded tentacles is 1.25 mm. in length, the calyx occupying about 0.9 mm.

On the prorachidial surface numerous minute zooids are to be seen, but no definite arrangement is recognisable. The shape of the axis is peculiar. The cross-section shows an irregular quadrilateral figure; the longest (metarachidial) side is 1.35 mm. in length and is slightly concave, the prorachidial side is 0.75 mm., and the two pararachidial sides are slightly convex and about 0.75 mm. in length. On the surface of the axis there are longitudinally elongated elevations like interrupted ridges.

This species resembles *V. rumphii* Kölliker in the close-set pinnules, in the crowded polyps, in the branching of the nutritive

canals, and in having a slightly flattened axis. It differs from it in having 66 polyps on a pinnule instead of 40-44, in having 2-4 rows of polyps instead of one row twisted so as to appear like two, and in having a different disposition of zooids.

Locality. Chuaka Bay, shore, lowest tide.

Family PENNATULIDÆ.

Subfamily PTEROEIDINÆ.

PTEROEIDES BRACHYCAULON Kölliker. (Plate XXVI. fig. 3.)

Belonging to this species there are several large specimens with a short rachis and a large spindle-shaped enlargement on the stalk.

	millims.
Length of pinnule-bearing portion	170
Breadth of pinnule-bearing portion	80
Length of stalk	50

On the rachis there is a broad bare space on the prorachidial surface; the corresponding part on the metarachidial aspect is hidden by the edges of the pinnules.

The colour is creamy with irregular patches and streaks of a purplish-blue.

The pinnules are 34 in number on each side, with two or three rudimentary forms at the lower end of the rachis. A well-developed pinnule has a breadth of 44 mm. and a height of 31 mm., and is supported by 16-18 rays.

The zooid-plate is median, leaving a crescent free from polyps at the basal insertion.

Locality. Kokotoni Harbour, West Coast of Zanzibar, 5 fathoms. Previously recorded from the Philippines.

PTEROEIDES RIGIDUM, sp. n. (Plate XXVI. figs. 1 & 2.)

Two specimens of a stiff colony very long in proportion to its breadth, apparently of a bluish-brown colour. As the zooid-plate is large and basal and the length of the rachis is at least eight times its breadth, the position of this species should be in Kolliker's group *Pt. argenteum*, but it does not agree with any of the forms there described.

The following measurements were taken from the stronger of the two specimens:—

	millims.
Total length of colony	230
Length of pinnule-bearing part	137
Length of stalk	93
Maximum breadth of pinnule-bearing part	17
Breadth of the middle of the stalk	8
Breadth of the swelling at the top of the stalk.....	10
Length of the swelling at the top of the stalk	15
Breadth of the pinnule halfway up	8
Height of the pinnule halfway up	5
Distance between pinnules	1.5-4.5
Breadth of the axis near the base	4

The stalk has a plump smooth appearance, but there are numerous small spicules in the cortical layer. The number of pinnules on each side is 46, but of these five on one side and seven on the other, situated at the top of the stalk, are rudimentary.

The metarachidial surface shows a bare streak 3-4 mm. in breadth, loosely overlapped by the pinnules in its middle region. There is no visible zooid streak, but the surface is not very well preserved. The prorachidial surface is smooth, and seems more deeply coloured than the rest; it varies in breadth from 3.5-10 mm. The rachis ends bluntly in a small bare area. In the other specimen the axis is exposed; it tapers rapidly to a fine point, and is soft and coiled for the last 14 mm.

The pinnules are somewhat reniform, with a narrow insertion. Thus, on one of the largest pinnules the insertion-line is only 4.5 mm. in length, but the outer margin is at least double. There seems to be some irregularity in the number of the supporting calcareous rays, but in some of the pinnules 4-6 are very distinct and project for about 1.5 mm. The specimen seems to have been somewhat battered, and no importance can be attached to the absence of rays in many of the pinnules.

The zooid-plate is basal and strongly developed. It extends in some about halfway up the pinnule; it is ridged and has an undulatory upper margin.

The polyps occur in three or four rows on each side of the margin of the pinnule, occupying a zone about 1.75 mm. in breadth.

The spicules of the cortical layer of the stalk consist of small rods and irregularly-branched forms. The following measurements in millims. were taken:—

Rods:— 0.2×0.03 .

Branched forms:— 0.25×0.175 ; 0.3×0.175 .

Locality. Wasin Channel, 8 fathoms.

PTEROEIDES PULCHELLUM, sp. n. (Plate XXVII. figs. 1 & 2.)

A beautiful finely-preserved colony, 37 mm. in total length and 13 mm. in breadth. The stalk is 16 mm. in length and 2.5 mm. in average breadth.

There are 15 (and 16) pinnules, of which 4 (and 5) at the base are very small. Each pinnule is supported by four rays of spicules, which may project about 2 mm. There are about 30 polyps arranged on the margin in a sinuous line, occasionally with young forms a little way down on either surface. The contracted polyps are barrel-shaped, with distinct longitudinal ridges, and the densely-crowded calices seem to differ much as to the depth of the indentation between them. A common height of calyx is 1 mm.; the expanded tentacles are 0.75 mm. in length and their tips enclose a circle about 1 mm. in diameter. There is a prominent oral cone and a circular mouth-aperture.

In some polyps the tentacles are pure white; in others they are backed by a chocolate-brown colour with a hint of blue. This colour is also seen in the calices and on the rachis, especially on its upper region.